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Truck Crop Production Practices

SAN JOAQUIN COUNTY, CALIFORNIA

Labor, Power, and Materials, by Operation

Farm Production Economics Division
Economic Research Service
U. S. Department of Agriculture

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HOW TO USE THE DATA

Different kinds of data are needed for different purposes. Some persons have need for data on average labor, power, and material inputs, while others, particularly county agents and farm budgeters, prefer data for usual or typical labor, power, and material inputs. The data in this report are presented in such a way as to satisfy both these needs.

Tables 1 and 2 contain information on the characteristics of farms in the sample. The remaining tables are for specific crops. There are four tables and a chart for each crop. These four sets of tables are not numbered in the usual way but are designated by the letters A, B, C, and D.

The tables lettered A present quantities and costs of materials used and of contract work hired per acre. Cost items included are direct costs only; they do not include charges for such items as land, overhead labor, and capital. Data that present only direct costs are somewhat limited in use. They are applicable in computing costs incurred in connection with crop insurance programs and are useful in partial farm budgeting to compare costs of producing alternative crops when charges for overhead labor, machinery, land, and so on, are the same for either crop and, hence, need not be taken into account.

These data are not appropriate and would be misleading for use as the sole criteria in judging whether or not a farmer made a profit on a crop or whether he should stay in business, or in making cost comparisons with crops grown in other areas. For these purposes, total costs are required.

Tables designated B present the various operations performed on the crops, the most common size of equipment used, the average number of times the operation was performed, the acreage covered, the man and power inputs per acre, and the total labor and power used per acre. These data do not reflect an accurate picture of operations or inputs on any one farm; they are averages of all operations and inputs.

Tables designated C present usual or typical labor and power inputs by operation. The accompanying charts show the seasonality of the operation by periods.

Tables designated D present for each operation the composition of the work force by major sources of workers.

Data in these tables were obtained from a sample of growers and are subject to sampling error. For some crops, particularly those having limited numbers of observations, large sampling errors are possible. Therefore, these data should be considered as approximations.

Tables A, B, and D are offered for those persons interested in average requirements. However, extension economists, county agents, farm budgeters, and others may have more use for the data on usual or typical situations shown in table C for each crop.

Farm labor placement officials and others concerned with the problem of obtaining and placing workers may find tables B and D and the charts of value in determining the number of workers necessary for each operation, and the period of time during which local seasonal workers and those from other areas will be needed to supplement the regular farm labor force.

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Previous publications in this group of reports on 1959 truck crop production practices covered the following areas:

Publication No.	Area Covered
ARS 43-132	Columbia County, Wis.
ERS-45	Accomack and Northampton Counties, Va.
ERS-79	Broward and Palm Beach Counties, Fla.
ERS-82	Colquitt County, Ga.
ERS-115	Cameron and Hidalgo Counties, Tex.
ERS-128	Imperial County, Calif.
ERS-129	Monterey County, Calif.

Washington, D.C. June 1964

TRUCK CROP PRODUCTION PRACTICES
SAN JOAQUIN COUNTY, CALIFORNIA

Labor, Power, and Materials, by Operation

By

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INTRODUCTION

In 1963 U.S. production of truck crops for fresh market and processing occupied 3.3 million acres of cropland. These crops used slightly more than 1 percent of the total cropland. The farm value of truck crops harvested for sale exceeded $1.2 billion, or an average of $361 per acre harvested.1/

Although the total acreage of truck crops is small, it is highly concentrated in areas with conditions favorable for production of these crops. The major areas are in California, Florida, Texas, the Eastern Seaboard from Georgia to Long Island, N. Y., the States bordering the Great Lakes, and the Pacific Northwest.

Truck crops in general require intensive labor. These requirements are highly seasonal--with several labor peaks, the highest occurring at harvesttime.

Most truck-crop operations other than land preparation are difficult to mechanize. Thinning and weeding are two preharvest operations still performed largely by hand labor. Harvesting of a majority of truck crops is still predominantly a hand operation. Most of these crops require repetitive pickings, which must be timely, as quality deteriorates very rapidly if the crops are not harvested at the optimum time.

These high labor demands have been difficult to meet, particularly during peak periods of weeding, thinning, and harvesting. Most truck-crop areas do not have sufficient local labor available to handle the crops during these periods. This has led many thousands of workers to migrate from one area to another during the peak seasons. In addition, many thousands of foreign workers are imported annually to help satisfy these heavy seasonal labor demands.

1/ U.S. Department of Agriculture Crop Reporting Board. Vegetables--Fresh Market 1963 Annual Summary--Acreage, Production, and Value of Principal Commercial Crops. Vg. 2-2-(63).

U.S. Department of Agriculture Crop Reporting Board. Vegetables--Processing 1963 Annual Summary--Acreage, Production, and Value of Principal Commercial Crops. Vg. 3-2(63).

Purchased inputs comprise a high proportion of the total inputs in the production of these crops. Most labor is hired. Fertilizer, seed, pesticides, and containers are significant items that are usually purchased. From 1953 to 1962, prices of these inputs increased relative to prices received for truck crops.

To gain further knowledge of some of the inputs involved in production of vegetables, information regarding the 1958-59 crop was obtained from 2,496 vegetable growers in 12 areas.2/ The areas sampled were the counties of (1) Erie, N. Y., (2) Accomack and Northampton, Va., (3) Colquitt, Ga., (4) Broward and Palm Beach, Fla., (5) Cameron and Hidalgo, Tex., (6) Berrien and Van Buren, Mich., (7) Columbia, Wis., (8) Yakima, Wash., (9) Marion, Oreg., (10) Imperial, Calif., (11) Monterey, Calif., and (12) San Joaquin, Calif.

The areas included in the survey were selected on the basis of importance of seasonal and overall production, diversity of crops grown--both for fresh market and for processing--and number and proportion of farmers harvesting truck crops for sale.3/

The survey population was defined as all farmers producing truck crops for sale whose farm headquarters were located within the survey area, except those residing outside the county and more than 20 road miles from their headquarters in the survey area. Within the survey area, a randomized area sampling plan was used to obtain the desired number of respondents.

This is the 8th in a group of 12 publications containing information on labor requirements, production practices, and costs involved in the production of truck crops for fresh market and processing. Information in this report was obtained from 250 producers in San Joaquin County, Calif. The area studied is shown in figure 1.

A separate report covering all 12 areas presents information on the extent to which production of truck crops has become vertically coordinated by either ownership or contractual agreements.4/

2/ The Crossley S-D Surveys, Inc., under U.S. Department of Agriculture, Agricultural Research Service contract #12-14-100-3826 (43) conducted the field survey and made preliminary tabulations. The author is responsible for the analysis of the data.

3/ Based on U.S. Department of Commerce Census of Agriculture, vols. I and II, 1954, and on the 1958 annual summaries of the series cited in footnote 1.

4/ Mighell, Ronald L., Jones, Lawrence A., and Gavett, Earle E. Contract Production of Truck Crops, 12 Selected Areas, United States. ERS-152, U.S. Dept. Agr., 1964.

Figure 1

CHARACTERISTICS OF SAN JOAQUIN COUNTY, CALIFORNIA

San Joaquin County, Calif., is one of the most important vegetable producing counties in the United States. Ranked according to value of vegetables sold in 1959, San Joaquin County was third in California and in the Nation. Its vegetable sales totaled $28.9 million, and was exceeded only by Monterey and Imperial Counties, Calif., with respective sales of $40.5 and $30.2 million. 5/

Vegetables were produced on 112,287 acres on 829 farms in San Joaquin County in 1959. This was 18 percent of the acreage of vegetables in the State and 14 percent of the farms growing vegetables. The sales of $28.9 million represented only 11 percent of the State total for 1959. Thus, the $257.80 average gross sales per acre was only 63 percent of the average of $408.69 per acre returned for all vegetables grown in the State.

The low gross returns per acre reflect the generally lower prices received for processed crops. Asparagus and tomatoes comprised 87 percent of the vegetable acreage harvested in San Joaquin County in 1959. About 65 percent of the total California asparagus production was sold for processing. Returns for production averaged $14.40 per hundredweight for fresh market asparagus and $9.50 for that which went to processing. The California weighted average price for all asparagus production

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5/ U.S. Department of Commerce, Census of Agriculture, vol. I, pt. 48, 1959.

was $11.25 per hundredweight, or $270 per acre. The difference between fresh and processed tomatoes is even greater: Early fall fresh market production returned an average of $1,548.00 per acre, compared with only $335.72 per acre of processed tomatoes. About 77 percent of all California tomato acreage was grown for processing.6/

San Joaquin is the leading asparagus county in the Nation. In 1959, nearly 53,000 acres of this crop was grown here. Located on 130 farms, asparagus in the county equaled 64 percent of State and 33 percent of the U.S. acreage. Soil and climatic conditions favor asparagus production in the delta area west of Stockton. Much of the asparagus is grown on the "islands" where soils are either peat or sedimentary. While the asparagus harvest usually starts late in February or early in March, San Joaquin County is generally regarded as a leading summer vegetable producing county.

San Joaquin County, the northern terminus of the great agricultural valley bearing the same name, depends upon irrigation for most of its water needs. Many growers are next to a river or slough and, having riparian rights, siphon water onto their fields. Excess water is pumped back. Some farmers use water from private wells, while others rely upon water companies for irrigation water.

In the fall and winter of 1959-60, information regarding the 1958-59 crop was obtained by personal interview with 250 farm operators in San Joaquin County who harvested vegetables for sale. This was a 30-percent sample of all truck-crop farms in the county.

The survey population was defined as all farmers in San Joaquin County, producing truck crops for sale whose farm headquarters were located within the survey area, except growers residing outside the county and more than 20 road miles from their headquarters. Within the survey area, a randomized area sampling plan was used to obtain the desired number of respondents.

The 250 farms included in the study had an average of 350 acres of cropland. Of this, truck crops were grown on 134 acres; fresh market crops averaged 65 acres and processed crops, 69 acres. About two-thirds of the farmers grew only one truck crop (table 1).

As mentioned previously, asparagus and tomatoes are the principal vegetable crops grown in San Joaquin County. Together, they accounted for 87 percent of the vegetable acreage in 1959. In this survey, these two crops accounted for 85 percent of the acreage in vegetables (table 2). The most commonly grown crop was tomatoes; 156 producers had acreage for processing. Eighteen growers reported some fresh market tomato acreage. This report presents information on the production of the 10 vegetable crops listed in table 2. Detailed information was obtained from most growers covering most of their vegetable acreage. However, insufficient data were obtained from some growers to permit inclusion of their operations in the analysis reported here. The most notable exclusion is one large planting of sweet peppers. Thus, the data presented for that crop are based on 36 acres on 8 farms, rather than the 70 acres grown on 9 farms, as reported in table 2. Data on tomatoes were

6/ U.S. Department of Agriculture, Statis. Rptg. Serv., Statis. Buls. 299 and 300, Dec. 1961.

Table 1.--Sample farms: Number, average acreage of cropland, and distribution of truck crops produced by farms in each size group, San Joaquin County, Calif., 1959

Cropland operated (acres)	Farms in size groups	Average acreage of cropland per farm	Distribution by number of crops produced						
			1	2	3	4	5	6	7
	Number	Acres	Farms	Farms	Farms	Farms	Farms	Farms	Farms
Under 30.0	51	15.3	17	14	12	4	4	0	0
30.0 - 99.9	42	58.8	29	3	5	3	1	0	1
100.0 - 149.9	30	125.7	25	4	0	1	0	0	0
150.0 - 189.9	24	170.1	21	2	0	0	1	0	0
190.0 - 299.9	27	223.0	17	9	0	1	0	0	0
300.0 - 499.9	27	401.6	22	4	1	0	0	0	0
500.0 - 639.9	16	545.5	10	4	0	1	0	0	1
640.0 - 1,399.9	23	921.9	16	4	3	0	0	0	0
1,400.0 and over	10	2,950.1	6	3	1	0	0	0	0
Total or average	250	349.6	163	47	22	10	6	0	2

Table 2.--Truck crops grown for fresh market and for processing on 250 farms, by acreage harvested, San Joaquin County, Calif., 1958-59

Crop	Farms on which crops were grown for--		Acreage harvested			Average acreage harvested per farm		
	Fresh market	Processing	Fresh market	Processing	Total	Fresh market	Processing	Total
	Number	Number	Acres	Acres	Acres	Acres	Acres	Acres
Asparagus	33	2	11,563	990	12,553	350	495	359
Cantaloups 1/	8	0	345	0	345	43	0	43
Carrots	34	2	462	75	537	14	38	15
Celery	6	0	340	0	340	57	0	57
Sweet corn	8	0	592	0	592	74	0	74
Dry onions	54	2	556	34	590	10	17	11
Sweet peppers	9	4	70	492	562	8	123	47
Tomatoes	18	156	800	14,964	15,764	44	96	94
Turnips	9	0	29	0	29	3	0	3
Watermelons	11	0	427	0	427	39	0	39
Other crops 2/	---	---	1,137	625	1,762	---	---	---
Total or average	---	---	16,321	17,180	33,501	---	---	134

1/ Includes honeydew and honeyball melons.
2/ Includes snap beans, cabbage, cucumbers, lettuce, green peas, squash, beets, broccoli, cauliflower, eggplant, endive, kale, mustard, okra, radishes, spinach, parsnips, and strawberries.

separated by market usage into fresh market and processing crops, as inputs vary considerably depending upon the intended use of the crop.

As previously explained, the data presented in this report reflect costs and practices for 1959. Since that time, changes have occurred in the commercial production of vegetables. Hence, these data should not be misconstrued to represent current vegetable production practices, inputs, and costs.

VEGETABLES FOR FRESH MARKET

The crops included in this section are those which, at time of planting, the grower intended to produce for the fresh market, except for asparagus which was grown for both fresh market and processing.

Asparagus

Figure 2 and tables A, B, C, and D present data on asparagus grown for fresh market and processing on 11,563 acres on 33 farms. The average yield per acre was 2,520 pounds.

Tractors were the chief source of power. Unless otherwise indicated, they were used for operations listed. Size of tractor was not obtained, but size of equipment used indicates the average tractor was a 3- or 4-plow tractor with a drawbar horsepower rating of 20 to 40. Major land preparation operations were performed by track-laying tractors having drawbar horsepower ratings of 50 to 80.

Asparagus growing in San Joaquin County is centered largely in the delta area of the San Joaquin River, near Stockton. Production on many of these survey farms was actually on islands of the delta. The water table is high, and irrigation is held to a minimum. All acreage was irrigated twice--once in the winter, for flooding purposes; and again after the cutting season was over in July.

The inputs in tables A through D refer only to producing beds. Not included are inputs for establishing and maintaining a bed for 2 years until it comes into production. Tabulation of plowedup beds indicates that the length of life of asparagus beds was 12 to 15 years. However, a panel of growers recommended bed renewal after 10 years. 7/

Preharvest labor inputs on this crop were low. Other than irrigating, disking and cultivating were the major operations.

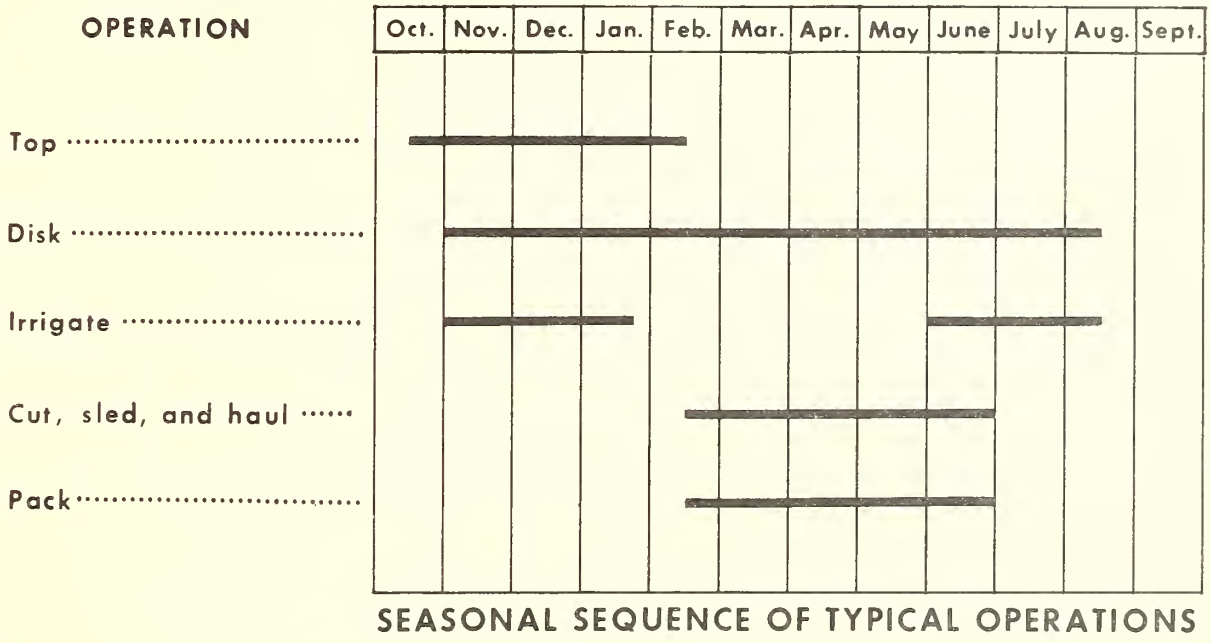
Asparagus is generally picked daily from mid-February through June. Harvesting is a continuous operation. Growers' estimates of the number of days ranged from 25 to 127 and averaged 78. The data obtained preclude segregating the labor input and the production by the market use. Thus, the estimates reported here are for harvesting of 2,520 pounds of asparagus spears per acre, part of which was for fresh market and part for processing.

7/ University of California Agricultural Extension Service. Asparagus Production Costs in San Joaquin County. Feb. 1961.

Seasonality of Operations

ASPARAGUS FOR FRESH MARKET AND PROCESSING

San Joaquin County, Calif., 1958-59



SEASONAL SEQUENCE OF TYPICAL OPERATIONS

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Figure 2

Table A.--Asparagus: Materials used and contract work hired, averages for 11,563 acres on 33 farms, San Joaquin County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Irrigation	Acre	1.0	2.78	2.78	100	2.78
Fertilizer nutrients:						
N	Pound	63.8	1/		44	
P_2O_5	Pound	30.5	1/	11.69	15	5.14
K_2O	Pound	39.6	1/		14	
Crate (including pads and nails)	Each	84.0	.36	30.24	100	30.24
Spray materials	Pound	18.1	.59	10.68	6	.64
Total	---	---	---	---	---	38.80
Contract work hired:						
Fertilize, application only	Acre	1.0	1.57	1.57	21	.33
Spray by plane, no materials	Pound	35.0	.05	1.75	2	.04
Spray by plane, includes materials	Acre	1.0	11.50	11.50	4	.46
Spray by ground rig, no materials	Hour	.33	2.00	.66	4	.03
Total	---	---	---	---	---	.86
Total materials and contract work	---	---	---	---	---	2/ 39.66

1/ Data not available.
2/ Average yield per acre--2,520 pounds. Average cost of materials and contract work per cwt.--$1.57.

Table B.--Asparagus: Labor, power, and machinery used in producing and harvesting, averages for 11,563 acres on 33 farms, San Joaquin County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Top	1-row topper	0.5	0.5	1.0	100	0.5	0.5
Disk	7-foot disk	.4	.4	5.5	65	1.4	1.4
Chisel	2-row chisel	.2	.2	3.9	45	.4	.4
Irrigate	---	2.1	---	2.0	94	3.9	---
Cultivate	2-row cultivator	.6	.6	7.4	20	.9	.9
Fertilize	2-row drill	.4	.3	1.0	23	.1	.1
Fertilize (custom)	2-row drill	.4	.3	1.0	21	.1	.1
Hoe and weed	---	2.2	---	1.0	8	.2	---
Spray (custom)	Plane	1/	1/	1.2	6	1/	1/
Spray (custom)	Boom sprayer	.3	.3	1.0	4	1/	1/
Total	---	---	---	---	---	7.5	3.4
Harvest:							
Cut by hand, sled, and haul	Tractor sled	1.0	1/	78.0	100	78.0	4.0
Pack	---	.2	---	78.0	100	15.6	---
Total	---	---	---	---	---	93.6	4.0
Total preharvest and harvest	---	---	---	---	---	2/ 101.1	2/ 7.4

1/ Less than 0.05 hour.
2/ Average yield per acre--2,520 pounds. Average labor and power used per cwt.--4.01 hours and 0.29 hour, respectively.

Table C.--Asparagus: Usual labor and power inputs, San Joaquin County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Top	1	0.5	0.5	0.5	0.5
Disk	6	.4	.4	2.4	2.4
Irrigate	2	2.1	---	4.2	---
Cut, sled, and haul	78	1.0	1/	78.0	4.0
Pack	78	.2	---	15.6	---
Total	---	---	---	100.7	6.9

1/ Less than 0.05 hour.

Table D.--Asparagus: Distribution of workers performing specified operations, by type of worker on 33 farms, San Joaquin County, Calif., 1958-59

Operation	Type of worker					
	Operator and unpaid family	Year-round hired	Local seasonal	Domestic migratory	Foreign	Custom
	Percent	Percent	Percent	Percent	Percent	Percent
Top	11	83	6	0	0	0
Disk	11	89	0	0	0	0
Chisel	21	74	5	0	0	0
Irrigate	17	55	28	0	0	0
Cultivate	19	81	0	0	0	0
Fertilize	5	45	9	0	0	41
Hoe and weed	0	0	100	0	0	0
Spray	0	0	0	0	0	100
Cut, sled, and haul	0	0	51	1	48	0
Pack	0	0	72	1	27	0

Cantaloups

Figure 3 and tables A, B, C, and D present data on cantaloups grown on 344 acres on 7 farms in 1958-59. The average yield per acre was 208 hundredweight.

Tractors were the chief source of power on these farms. Unless otherwise indicated, they were used for operations listed. Size of tractor was not obtained in the survey, but size of equipment used indicates the average tractor was a 3- or 4-plow tractor having a drawbar horsepower rating of 20 to 40. Major land preparation operations were performed by tracklaying tractors with drawbar horsepower ratings of 50 to 80.

Basic land preparation was done in the fall and winter, but final land fitting was delayed until just before planting. Earliest planting of cantaloups occurred early in March, but some of this acreage had to be replanted because of failure of seeds to sprout in the cold ground.

About 40 percent of the cantaloup acreage was not fertilized. This land had previously been planted to alfalfa, potatoes, and small grains. Land on which cantaloups were listed as the previous crop was fertilized but not with a heavy application.

Harvesting of cantaloups was performed an average of 6.3 times per acre. Foreign workers did most of the picking; domestic migrants did the bulk of the packing. Loading and hauling were performed by workers hired by commercial packing firms, and their inputs were not obtained.

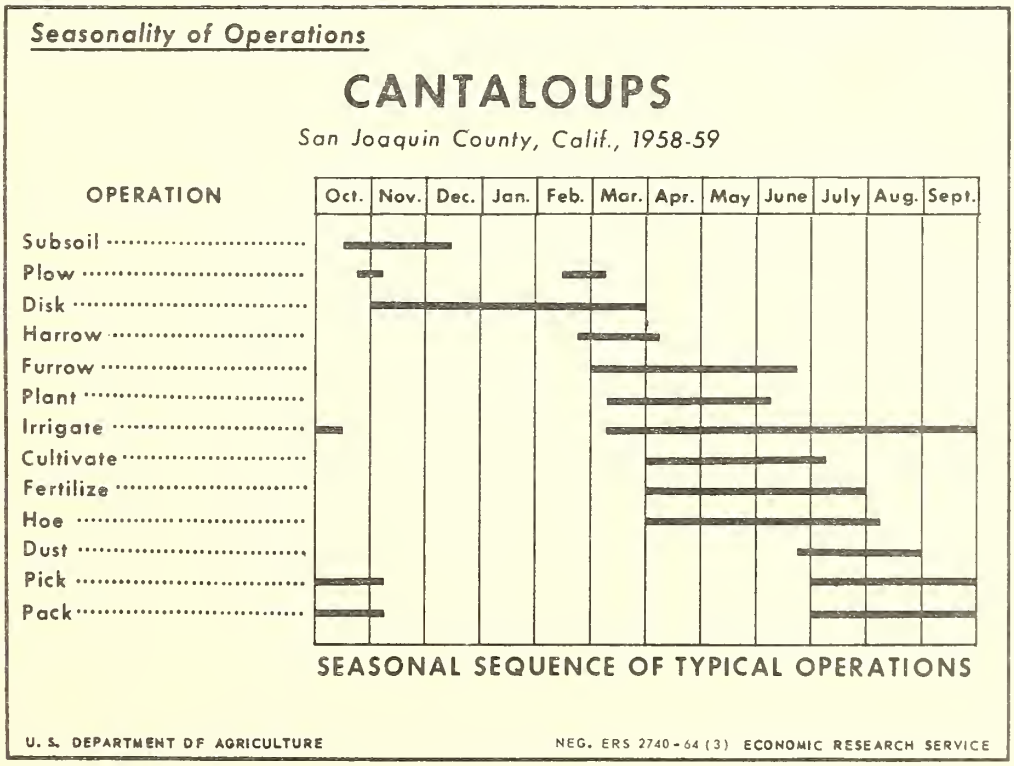

Figure 3

Table A.--Cantaloups: Materials used and contract work hired, averages for 344 acres on 7 farms, San Joaquin County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	1.9	1.84	3.50	120 1/	4.20
Fertilizer nutrients:						
N	Pound	52.1	2/	2/	58	15.10
P_2O_5	Pound	44.7	2/	2/	58	
K_2O	Pound	16.0	2/	2/	28	
Dust	Pound	37.2	.20	7.44	72	5.36
Spray	Pound	4.0	1.50	6.00	28	1.68
Irrigation water	Acre	6.9	1.52	10.49	100	10.49
Crates	Each	260.0	.60	156.00	70	109.20
Total	---	---	---	---	---	146.03
Contract work hired:						
Dust by plane, no materials	Acre	1.1	2.53	2.78	58	1.61
Spread manure, includes manure	Acre	1.0	15.00	15.00	11	1.65
Total	---	---	---	---	---	3.26
Total materials and contract work	---	---	---	---	---	3/ 149.29

1/ Twenty percent of acreage was replanted.
2/ Data not available.
3/ Average yield per acre--208 cwt. Average cost of materials and contract work per cwt.--$0.72.

Table B.--Cantaloups: Labor, power, and machinery used in producing and harvesting, averages for 344 acres on 7 farms, San Joaquin County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Subsoil	1-tooth subsoiler	1.1	1.1	0.7	52	0.4	0.4
Plow	4 14-inch moldboard	.4	.4	1.0	52	.2	.2
Spread manure (custom)	Truck spreader	.3	.3	1.0	11	1/	1/
Disk	8-foot offset	.4	.4	2.4	100	1.0	1.0
Chisel	3-tooth chisel	.7	.7	2.6	48	.9	.9
Harrow	12-foot springtooth	.4	.4	1.0	75	.3	.3
Furrow	1 14-inch shovel	.5	.5	1.1	89	.5	.5
Plant	1-row sled planter	.7	.6	1.2	100	.8	.7
Irrigate	---	1.3	---	6.9	100	9.0	---
Cultivate	1-row cultivator	1.0	1.0	3.7	100	3.7	3.7
Fertilize	1-row applicator	.6.	.6	1.5	58	.5	.5
Hoe	---	6.2	---	2.5	79	12.3	---
Thin	---	7.9	---	1.0	25	2.0	---
Dust	4-row duster	.4	.4	1.2	14	.1	.1
Dust (custom)	Plane	.1	.1	1.1	58	.1	.1
Spray	6-row boom sprayer	.2	.2	4.0	28	.2	.2
Ditch	8-foot grader	.4	.4	1.0	28	.1	.1
Total	---	---	---	---	---	32.1	8.7
Harvest:							
Pick	---	15.2	---	6.3	100	95.8	---
Pack	---	2.5	---	6.3	100	15.8	---
Total	---	---	---	---	---	111.6	---
Total preharvest and harvest	---	---	---	---	---	2/ 143.7	2/ 8.7

1/ Less than 0.05 hour.
2/ Average yield per acre--208 cwt. Average labor and power used per cwt.--0.69 hour and 0.04 hour, respectively.

Table C.--Cantaloups: Usual labor and power inputs, San Joaquin County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Subsoil	1	1.1	1.1	1.1	1.1
Plow	1	.4	.4	.4	.4
Disk	2	.4	.4	.8	.8
Harrow	1	.4	.4	.4	.4
Furrow	1	.5	.5	.5	.5
Plant	1	.7	.6	.7	.6
Irrigate	7	1.3	---	9.1	---
Cultivate	4	1.0	1.0	4.0	4.0
Fertilize	2	.6	.6	1.2	1.2
Hoe	2	6.2	---	12.4	---
Dust (custom)	1	.1	.1	.1	.1
Pick	6	15.2	---	91.2	---
Pack	6	2.5	---	15.0	---
Total	---	---	---	136.9	9.1

Table D.--Cantaloups: Distribution of workers performing specified operations, by type of worker on 7 farms, San Joaquin County, Calif., 1958-59

Operation	Type of worker				
	Operator and unpaid family	Year-round hired	Local seasonal	Domestic migratory	Foreign
	Percent	Percent	Percent	Percent	Percent
Subsoil	0	50	50	0	0
Plow	0	50	50	0	0
Spread manure 1/	0	0	0	0	0
Disk	57	29	14	0	0
Chisel	75	25	0	0	0
Harrow	75	25	0	0	0
Furrow	100	0	0	0	0
Plant	75	25	0	0	0
Irrigate	40	40	20	0	0
Cultivate	50	17	8	25	0
Fertilize	34	33	33	0	0
Hoe	3	0	79	0	18
Thin	23	8	69	0	0
Dust 1/	0	100	0	0	0
Spray	0	100	0	0	0
Ditch	50	50	0	0	0
Pick	11	0	12	7	70
Pack	0	0	20	80	0

1/ Excludes custom operations.

Carrots

Figure 4 and tables A, B, C, and D present data on the growing of carrots for the fresh market on 403 acres on 32 farms. The average yield per acre was 16.3 tons of topped carrots.

Tractors were the chief source of power on these farms. Unless otherwise indicated, they were used for operations listed. While size of tractor was not obtained in the survey, size of equipment used indicates that the average tractor was a 2- or 3-plow tractor with a drawbar horsepower rating of 20 to 40. Major land preparation operations were performed by tracklaying tractors having drawbar horsepower ratings of 50 to 80.

Chemical weedkillers were used on about half the carrot acreage. Using 1.0 hour of labor and about $14 worth of spray materials eliminated from 24 to 50 hours of hand hoeing and weeding per acre.

Harvest labor inputs cover only a portion of the total carrot acreage. Producers sold carrots still growing in the field on 44 percent of the acreage. On 36 percent of the acreage, they performed only the lifting operation before selling the crop. Only on 20 percent of the 403 acres were the carrots lifted, topped, loaded, and hauled to the produce sheds by producers. Inputs are reported on those operations performed up to the point of sale by the grower.

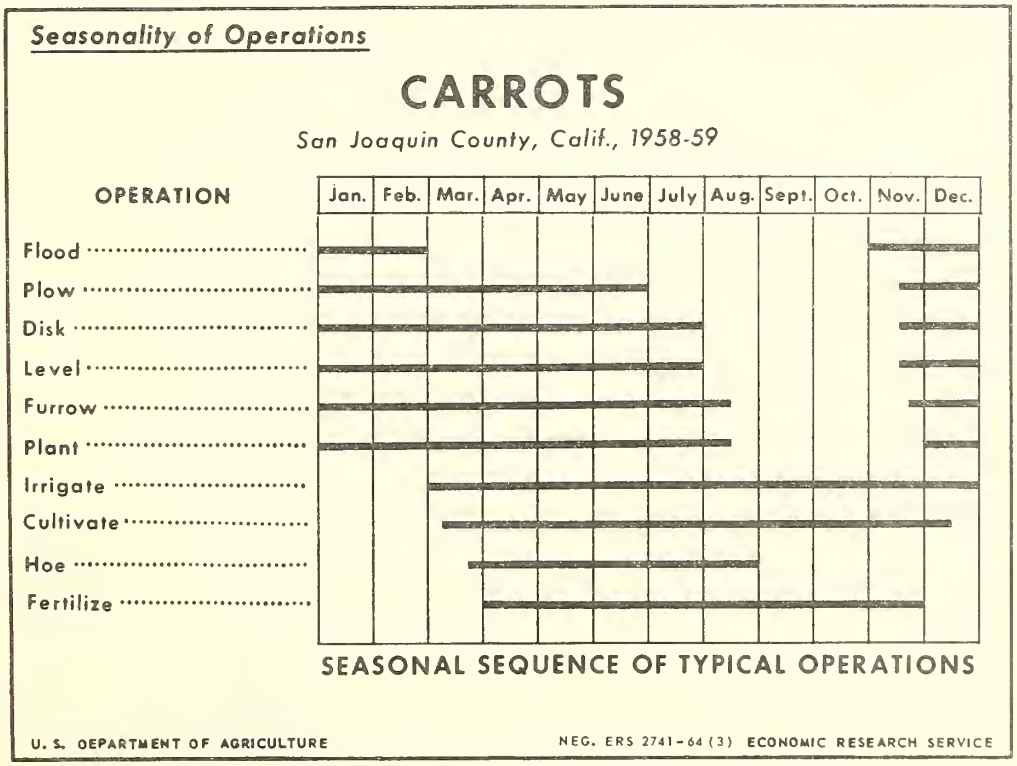

Figure 4

Table A.--Carrots: Materials used and contract work hired, averages for 403 acres on 32 farms, San Joaquin County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	2.69	2.61	7.02	100	7.02
Weed spray	Gallon	63.30	.22	13.93	48	6.69
Fumigants	Gallon	18.40	1.85	34.04	39	13.28
Fertilizer nutrients:						
N	Pound	68.1	1/	1/	100	20.03
P_2O_5	Pound	54.2	1/	1/	94	
K_2O	Pound	52.0	1/	1/	94	
Irrigation water	Application	14.1	.81	11.42	100	11.42
Picking sacks	Each	15.0	.10	1.50	30	.45
Picking boxes	Each	21.0	.25	5.25	22	1.16
Total	---	---	---	---	---	60.05
Contract work hired:						
Fumigate, application only	Application	1.0	4.44	4.44	13	.58
Fumigate, includes fumigant	Application	1.0	45.44	45.44	2	.91
Spread manure, includes manure	Ton	3.6	20.00	72.00	2	1.44
Spray weedkiller, application only	Application	1.0	3.58	3.58	8	.29
Total	---	---	---	---	---	3.22
Total preharvest and harvest	---	---	---	---	---	2/ 63.27

1/ Less than 0.05 hour.
2/ Average yield per acre--16.3 tons. Average cost of materials and contract work per ton--$3.88.

Table B.--Carrots: Labor, power, and machinery used in growing and harvesting, averages for 403 acres on 32 farms, San Joaquin County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Flood	---	1.8	---	1.0	91	1.6	---
Plow	2-bottom 14-inch moldboard	2.2	2.2	1.1	51	1.2	1.2
Disk	8-foot offset	1.1	1.1	2.2	100	2.4	2.4
Level	12 x 60-foot landplane	1.1	1.1	1.1	94	1.1	1.1
Harrow	8-foot springtooth	.9	.9	1.0	24	.2	.2
Furrow	2-row shovel cultivator	1.4	1.4	1.2	89	1.5	1.5
Fumigate	7-foot drill	.9	.9	1.0	26	.2	.2
Fumigate (custom)	7-foot drill	.9	.9	1.0	15	.1	.1
Spread manure (custom)	Truck spreader	3.8	3.8	1.0	2	.1	.1
Plant	2-row planter	1.7	1.1	1.0	100	1.7	1.1
Spray weedkiller	4-row sprayer	1.0	1.0	1.1	40	.4	.4
Spray weedkiller (custom)	4-row sprayer	1.0	1.0	1.1	8	.1	.1
Irrigate	---	1.7	---	14.1	100	24.0	---
Cultivate	2-row shovel cultivator	1.4	1.4	3.9	100	5.5	5.5
Weed	---	18.4	---	1.5	24	6.6	---
Hoe	---	11.7	---	2.0	51	11.9	---
Fertilize	2-row drill	1.3	1.3	1.0	100	1.3	1.3
Cultivate and fertilize	2-row cultivator/attachment	2.0	2.0	1.0	2	1/	1/
Total	---	---	---	---	---	59.9	15.2
Harvest:							
Lift	2-row lifter	5.9	5.9	1.0	36	2.1	2.1
Lift, top, load, and haul	2-row lifter, trailer	167.4	9.9	1.0	20	33.5	2.0
Total	---	---	---	---	---	2/ 35.6	2/ 4.1
Total preharvest and harvest	---	---	---	---	---	3/ 95.5	3/ 19.3

1/ Less than 0.05 hour.

2/ Excludes all harvest inputs on 44 percent of the acreage, and all but lifting inputs on 80 percent of the acreage. Harvesting of carrots on the excluded acreage was performed by crews hired by carrot buyers who purchased the crop in the field.

3/ Average yield per acre--16.3 tons. Average labor and power used per ton--5.86 hours, and 1.18 hours, respectively.

Table C.--Carrots: Usual labor and power inputs, San Joaquin County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Flood	1	1.8	---	1.8	---
Plow	1	2.2	2.2	2.2	2.2
Disk	2	1.1	1.1	2.2	2.2
Level	1	1.1	1.1	1.1	1.1
Furrow	1	1.4	1.4	1.4	1.4
Plant	1	1.7	1.1	1.7	1.1
Irrigate	14	1.7	---	23.8	---
Cultivate	4	1.4	1.4	5.6	5.6
Hoe	2	11.7	---	23.4	---
Fertilize	1	1.3	1.3	1.3	1.3
Total	---	---	---	64.5	14.9

Table D.--Carrots: Distribution of workers performing specified operations, by type of worker on 32 farms, San Joaquin County, Calif., 1958-59

Operation	Type of worker			
	Operator and unpaid family	Year-round hired	Local seasonal	Custom
	Percent	Percent	Percent	Percent
Flood	0	100	0	0
Plow	94	3	3	0
Disk	91	6	3	0
Level	92	8	0	0
Harrow	78	11	11	0
Furrow	93	3	4	0
Fumigate	33	6	0	61
Spread manure	0	0	0	100
Plant	83	14	3	0
Spray weedkiller	78	4	0	18
Irrigate	87	11	2	0
Cultivate	94	6	0	0
Weed	82	0	18	0
Hoe	0	0	100	0
Fertilize	88	8	4	0
Cultivate and fertilize	100	0	0	0
Lift	100	0	0	0
Lift, top, load, and haul	39	2	59	0

Celery

Figure 5 and tables A, B, C, and D present information obtained covering the growing and harvesting of celery for the fresh market on 340 acres on 6 farms in 1958-59. The average yield was 366.6 hundredweight per acre.

Tractors were the chief source of power on these farms. Size of tractor was not obtained in the survey, but considering the size of equipment used it appears the average tractor was a 2- or 3-plow tractor with a drawbar horsepower rating of 15 to 30. Major land preparation operations were performed by tracklaying tractors with drawbar horsepower ratings of 50 to 80.

Most of the celery acreage was set with transplants. Only 4 percent of the acreage was seeded and not transplanted. Another 4 percent was set with purchased plants. The remaining acreage was set with homegrown plants.

The transplanting operation required the most labor of any preharvest job. When plants were set by hand--on 60 percent of the acreage--the job took 113 hours per acre. The use of a mechanical transplanter reduced labor input for this task by 87 percent to only 14.4 hours per acre. However, machine transplanting occurred on only 36 percent of the acreage.

No celery harvesting machines were used on these farms. The entire acreage was hand harvested. Cutting, trimming, and packing took 227 hours per acre, or 0.6 hour per hundredweight of celery. In addition, nearly 20 hours per acre were used for loading and hauling.

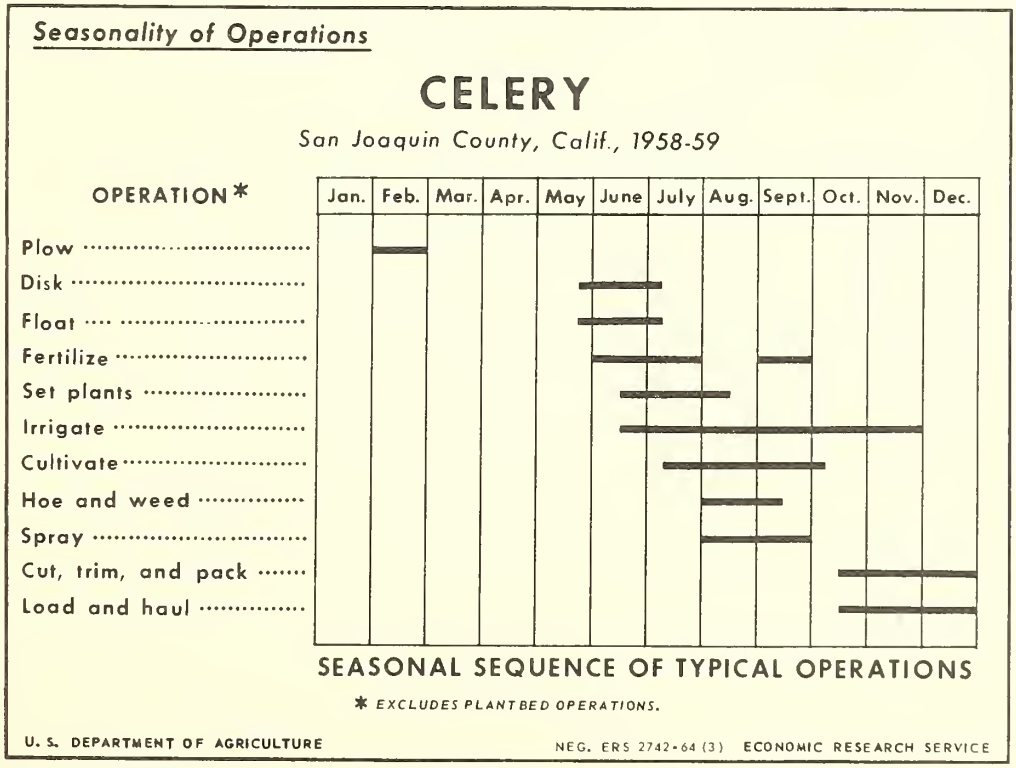

Figure 5

Table A.--Celery: Materials used and contract work hired, averages for 340 acres on 6 farms, San Joaquin County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	0.06	17.11	1.03	96	0.99
Plants	Thousand	40.00	1.00	40.00	4	1.60
Fertilizer nutrients:						
N	Pound	111.6	1/	1/	100	56.40
P_2O_5	Pound	209.6	1/	1/	100	
K_2O	Pound	229.0	1/	1/	100	
Irrigation water	Acre	1.0	14.11	14.11	7	.99
Spray, DDT	Pound	152.4	.105	16.00	100	16.00
Spray, weedkiller	Gallon	41.4	.21	8.69	14	1.22
Dust, DDT-TOX-sulfur	Pound	106.5	.12	12.78	43	5.50
Crates and liners	Each	750.0	.26	195.00	100	195.00
Total	---	---	---	---	---	277.70
Contract work hired:						
Dust by plane, no materials	Pound	104.3	.05	5.22	43	2.24
Spray, by boomsprayer, no materials	Acre	3.0	2.00	6.00	56	3.36
Drill fertilizer, no materials	Acre	2.0	2.00	4.00	56	2.24
Total	---	---	---	---	---	7.84
Total materials and contract work	---	---	---	---	---	2/ 285.54

1/ Data not available.
2/ Average yield per acre--366.6 cwt. Average cost of materials and contract work per cwt.--$0.78.

Table B.--Celery: Labor, power, and machinery used in producing and harvesting, averages for 340 acres on 6 farms, San Joaquin County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Plantbed (33 acres on 2 farms)							
Plow	2-bot. 14-inch moldbd.	0.9	0.9	1.0	100	0.9	0.9
Disk	8-foot offset	.9	.9	1.0	100	.9	.9
Float	12-foot float	.4	.4	1.0	100	.4	.4
Seed	2-row drill	4.8	2.7	1.0	100	4.8	2.7
Spray weedkiller	4-row boom sprayer	1.0	1.0	1.6	100	1.6	1.6
Irrigate	---	2.5	---	3.0	100	7.5	---
Pull plants	---	590.9	---	1.0	100	590.9	---
Total per acre of plantbed	---	---	---	---	---	607.0	6.5
Total per acre of field celery 1/	---	---	---	---	---	63.9	.7
Field (340 acres on 6 farms)							
Preharvest:							
Plantbed	---	63.9	.7	1.0	92	58.8	.6
Plow	4-bot. 14-inch moldbd.	.5	.5	1.0	100	.5	.5
Disk	15-foot offset	.5	.5	1.1	100	.6	.6
Flood	---	1.3	---	1.2	37	.6	---
Float	12-foot float	.3	.3	1.0	100	.3	.3
~~Harrow~~	3-section spiketooth	.7	.7	1.6	7	.1	.1
Furrow	2-row lister	1.3	1.3	2.7	7	.2	.2
Fertilize	2-row drill	.6	.4	1.3	44	.3	.2
Fertilize (custom)	2-row drill	.6	.4	2.0	56	.7	.4
Seed	2-row drill	24.0	24.0	1.0	1	.2	.2
Seed	---	85.0	---	1.0	3	2.6	---
Set plants	---	112.7	---	1.0	60	67.6	---
Set plants	3-row transplanter	14.4	1.4	1.0	36	5.2	.5
Irrigate	---	1.5	---	10.2	100	15.3	---
Cultivate	2-row cultivator	.9	.9	1.4	100	1.3	1.3
Hoe and weed	---	43.0	---	1.0	58	24.9	---
Spray	8-row boom sprayer	.3	.3	3.5	44	.5	.5
Spray (custom)	8-row boom sprayer	.2	.1	3.0	56	.3	.2
Spray weedkiller	8-row boom sprayer	.4	.4	1.0	6	2/	2/
Dust (custom)	Plane	2/	2/	2.3	43	2/	2/
Total	---	---	---	---	---	180.0	5.6
Harvest:							
Cut, trim, and pack	---	227.0	---	1.0	100	227.0	---
Load and haul	Trucks	19.4	10.2	1.0	100	19.4	10.2
Total	---	---	---	---	---	246.4	10.2
Total preharvest and harvest	---	---	---	---	---	3/426.4	3/15.8

1/ One acre of plantbed per 9.5 acres of celery.

2/ Less than 0.05 hour.

3/ Average yield per acre--366.6 cwt. Average labor and power used per cwt.--1.16 hours and 0.04 hour, respectively.

Table C.--Celery: Usual labor and power inputs, San Joaquin County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Plantbed 1/	1	63.9	0.7	63.9	0.7
Plow	1	.5	.5	.5	.5
Disk	1	.5	.5	.5	.5
Float	1	.3	.3	.3	.3
Fertilize (custom)	2	.6	.4	1.2	.8
Set plants	1	112.7	---	112.7	---
Irrigate	10	1.5	---	15.0	---
Cultivate	1	.9	.9	.9	.9
Hoe and weed	1	43.0	---	43.0	---
Spray (custom)	3	.2	.1	.6	.3
Cut, trim, and pack	1	227.0	---	227.0	---
Load and haul	1	19.4	10.2	19.4	10.2
Total	---	---	---	485.0	14.2

1/ One acre of plantbed provided plants for 9.5 acres of celery.

Table D.--Celery: Distribution of workers performing specified operations, by type of worker on 340 acres on 6 farms, San Joaquin County, Calif., 1958-59

Operation	Type of worker					
	Operator and unpaid family	Year-round hired	Local seasonal	Domestic migratory	Foreign	Custom
	Percent	Percent	Percent	Percent	Percent	Percent
Plantbed:						
Plow	0	100	0	0	0	0
Disk	0	100	0	0	0	0
Float	0	100	0	0	0	0
Seed	0	100	0	0	0	0
Spray weedkiller	0	100	0	0	0	0
Irrigate	0	100	0	0	0	0
Pull plants	0	33	0	33	34	0
Field celery:						
Plow	43	57	0	0	0	0
Disk	43	57	0	0	0	0
Flood	0	100	0	0	0	0
Float	67	33	0	0	0	0
Harrow	67	33	0	0	0	0
Furrow	75	25	0	0	0	0
Fertilize	33	50	0	0	0	17
Seed by machine	100	0	0	0	0	0
Seed by hand	100	0	0	0	0	0
Set plants by hand	0	0	18	41	41	0
Set plants by machine	0	100	0	0	0	0
Irrigate	33	67	0	0	0	0
Cultivate	29	71	0	0	0	0
Hoe and weed	4	0	0	44	52	0
Spray	33	50	0	0	0	17
Dust	0	0	0	0	0	100
Cut, trim, and pack	1	0	49	25	25	0
Load and haul	0	0	100	0	0	0

Sweet Corn

Figure 6 and tables A, B, C, and D present data on the production of sweet corn for the fresh market from 592 acres on 8 farms in 1959. The average yield per acre was 189 crates (5 dozen ears, each).

Tractors were the chief source of power on these farms. Unless otherwise indicated, they were used for operations listed. While size of tractor was not obtained in the survey, size of equipment used indicates the average tractor was about a 3-plow tractor having a drawbar horsepower rating of 20 to 30. Major land preparation operations were performed by tracklaying tractors with drawbar horsepower ratings of 50 to 80.

There was very little handwork done in the growing of sweet corn. Other than irrigating, only very small acreages were hand weeded, thinned, and dusted. Harvesting corn for fresh market is still a hand operation. The only mechanical equipment used was tractor-drawn trailers for hauling the corn to produce sheds. Growers sold production on about 60 percent of the acreage while it was still growing in the field. It was harvested by the purchasers' crews and these inputs were not obtained.

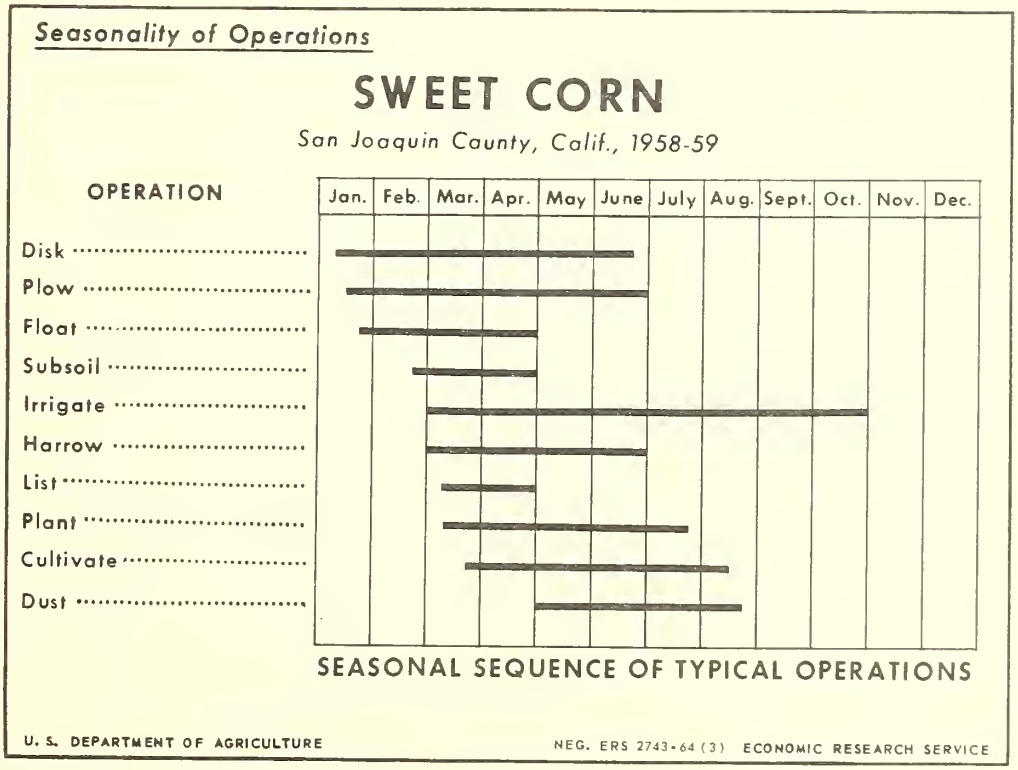

Figure 6

Table A.--Sweet corn: Materials used and contract work hired, averages for 592 acres on 8 farms, San Joaquin County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	14.6	0.41	5.99	100	5.99
Fertilizer nutrients:						
N	Pound	77.3	1/	1/	60	14.23
P_2O_5	Pound	60.0	1/	1/	46	
K_2O	Pound	60.0	1/	1/	46	
Spray and dust materials	Pound	126.8	.117	14.84	90	13.36
Crates	Each	175.0	.153	26.78	5	1.34
Irrigation water	Application	5.9	2.56	15.10	2/ 64	9.66
Total	---	---	---	---	---	44.58
Contract work hired:						
Fertilize, materials included	Ton	.25	80.00	20.00	4	.80
Dust by plane, application only	Pound	111.9	.05	5.60	84	4.70
Total	---	---	---	---	---	5.50
Total materials and contract work	---	---	---	---	---	3/ 50.08

1/ Data not available.

2/ Remaining acreage was irrigated by electric pump. Operators did not estimate cost of pump operation. No charge for water.

3/ Average yield per acre--189 crates (5 dozen ears, each). Average cost of materials and contract work per crate--$0.26.

Table B.--Sweet corn: Labor, power, and machinery used in producing and harvesting, averages for 592 acres on 8 farms, San Joaquin County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Disk	10-foot offset	0.5	0.5	1.6	100	0.8	0.8
Plow	3 14-inch bottoms	.7	.7	1.0	90	.6	.6
Float	15 x 60-foot landplane	.3	.3	1.0	96	.3	.3
Subsoil	3-shank chisel	.8	.8	1.0	56	.4	.4
Irrigate	---	1.7	---	5.9	100	10.0	---
Fertilize	2-row drill	.6	.3	1.0	60	.4	.2
Fertilize (custom)	2-row drill	.6	.3	1.0	4	1/	1/
Harrow	7-foot springtooth	.6	.6	1.2	56	.4	.4
List	3-shank lister	.4	.4	1.0	58	.2	.2
Plant	4-row planter	1.1	.4	1.0	100	1.1	.4
Cultivate	2-row cultivator	1.0	1.0	1.0	100	1.0	1.0
Weed and thin	---	70.0	---	1.0	2	1.4	---
Spray	6-row boom sprayer	.4	.2	1.0	40	.2	.1
Dust	---	7.7	---	3.6	1	.3	---
Dust (custom)	Plane	1/	1/	2.3	84	1/	1/
Total	---	---	---	---	---	17.1	4.4
Harvest:							
Pick and load by hand and haul	Trailer	10.6	1.0	4.0	2/ 41	17.4	1.6
Pack	---	8.0	---	4.0	5	1.6	---
Total	---	---	---	---	---	19.0	1.6
Total preharvest and harvest	---	---	---	---	---	3/ 36.1	3/ 6.0

1/ Less than 0.05 hour.
2/ Production on the remaining 59 percent of the acreage was sold in the field.
3/ Average yield per acre--189 crates (5 dozen ears, each). Average labor and power used per crate--0.19 hour and 0.03 hour, respectively.

Table C.--Sweet corn: Usual labor and power inputs, San Joaquin County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Disk	2	0.5	0.5	1.0	1.0
Plow	1	.7	.7	.7	.7
Float	1	.3	.3	.3	.3
Subsoil	1	.8	.8	.8	.8
Irrigate	6	1.7	---	10.2	---
Fertilize	1	.6	.3	.6	.3
Harrow	1	.6	.6	.6	.6
List	1	.4	.4	.4	.4
Plant	1	1.1	.4	1.1	.4
Cultivate	1	1.0	1.0	1.0	1.0
Dust by plane	2	1/	1/	1/	1/
Total	---	---	---	16.7	5.5

1/ Less than 0.05 hour.

Table D.--Sweet corn: Distribution of workers performing specified operations, by type of worker on 8 farms, San Joaquin County, Calif., 1958-59

Operation	Type of worker				
	Operator and unpaid family	Year-round hired	Local seasonal	Foreign	Custom
	Percent	Percent	Percent	Percent	Percent
Disk	42	58	0	0	0
Plow	45	55	0	0	0
Float	30	70	0	0	0
Subsoil	0	100	0	0	0
Irrigate	38	62	0	0	0
Fertilize	14	57	15	0	14
Harrow	67	33	0	0	0
List	0	100	0	0	0
Plant	42	58	0	0	0
Cultivate	38	50	12	0	0
Weed and thin	68	32	0	0	0
Spray	67	33	0	0	0
Dust	60	10	10	0	20
Pick, load, and haul	75	9	8	8	0
Pack	67	33	0	0	0

Figure 7 and tables A, B, C, and D present data covering the production of dry onions grown for the fresh market on 511 acres on 48 farms in 1958-59. The average yield per acre was 321.8 hundredweight.

Tractors were the chief source of power on these farms. Size of tractor was not obtained in the survey. Considering the size of equipment used, it appears that the average tractor was a 2- or 3-plow tractor with a drawbar horsepower rating of 15 to 30. Major land preparation operations were performed by tracklaying tractors having drawbar horsepower ratings of 50 to 80.

All of the onion acreage was irrigated, but costs of irrigation in table A cover only 67 percent of the acreage. The remainder was irrigated from private water sources. Growers did not estimate the cost of running electric water pumps.

Chemical weedkillers were used on more than 60 percent of the acreage. Using 0.6 hour of labor and from $6 to $14 worth of spray materials eliminated from 35 to 50 hours of hand hoeing and weeding per acre.

Harvesting of onions followed this sequence: undercut, windrow by hand, top, sack, load, and haul. Most growers undercut and windrowed, then sold their crops in the windrow. A small acreage was topped before being sold. Inputs were not recorded when they accrued after sale of the crop.

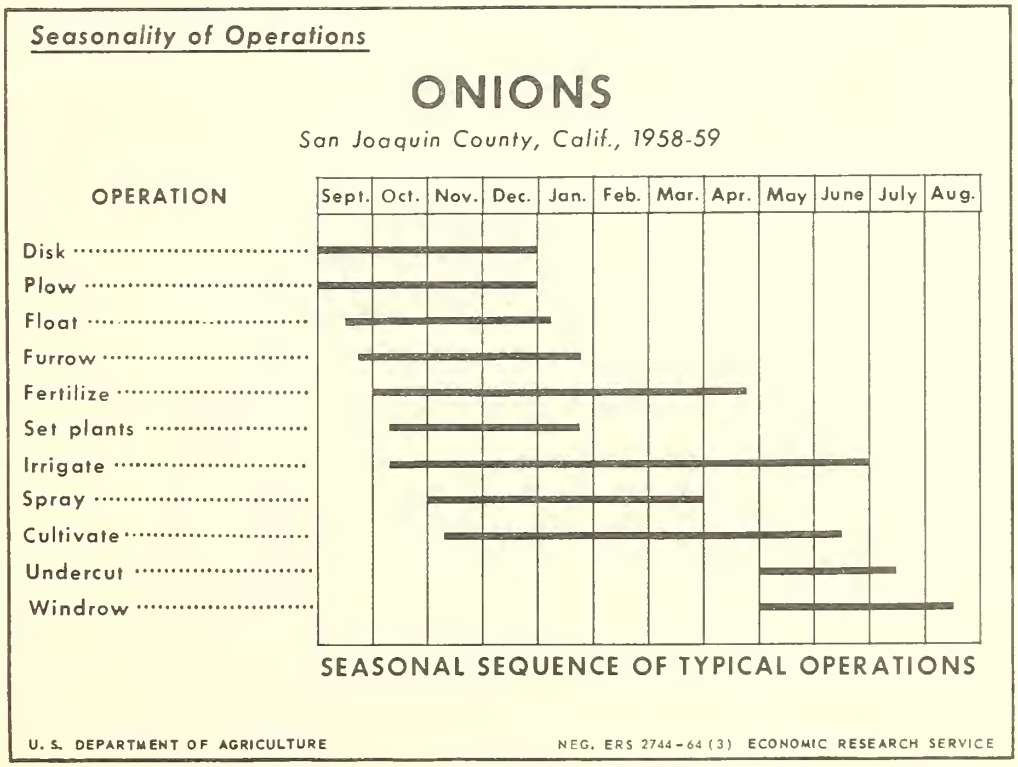

Figure 7

Table A.--Onions: Materials used and contract work hired, averages for 511 acres on 48 farms, San Joaquin County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	3.8	3.37	12.81	46	5.89
Plants	Flat	42.4	1.00	42.40	54	22.90
Fertilizer nutrients:						
N	Pound	77.3	1/	1/	100	34.33
P_2O_5	Pound	72.5	1/	1/	100	
K_2O	Pound	57.0	1/	1/	97	
Spray, CIPC	Gallon	1.10	12.51	13.76	48	6.60
Spray, Dow Selective	Gallon	1.85	3.40	6.29	20	1.26
Dust, DDT	Pound	77.9	.14	10.91	27	2.95
Irrigation water	Acre	1.0	10.65	10.65	67	7.14
Total	---	---	---	---	---	81.07
Contract work hired:						
Spray by plane, application only	Acre	1.1	3.35	3.68	9	.33
Spray by boom sprayer, application only	Acre	1.0	2.50	2.50	16	.40
Dust by plane, application only	Acre	2.1	1.99	4.18	23	.96
Total	---	---	---	---	---	1.69
Total materials and contract work	---	---	---	---	---	2/ 82.76

1/ Data not available.
2/ Average yield per acre--321.8 cwt. Average cost of materials and contract work per cwt.--$0.26.

Table 8.--Onions: Labor, power, and machinery used in producing and harvesting, averages for 511 acres on 48 farms, San Joaquin County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Disk	8-foot offset	1.0	1.0	2.5	100	2.5	2.5
Plow	2-bottom 16-inch moldboard	1.7	1.7	1.0	74	1.3	1.3
Chisel	6-shank	1.2	1.2	1.0	17	.2	.2
Level	12 x 60-foot landplane	1.3	1.3	1.1	25	.4	.4
Float	10-foot float	.6	.6	1.3	57	.4	.4
Furrow	2-row cultivator	1.6	1.6	1.3	100	2.1	2.1
Fertilize	2-row drill	1.3	1.3	1.4	85	1.5	1.5
Harrow	4-section springtooth	.8	.8	1.4	18	.2	.2
Seed and fertilize	2-row seeder	1.0	1.0	1.0	10	.1	.1
Set plants	---	92.3	---	1.0	90	83.1	---
Spray	6-row boom sprayer	.6	.6	1.2	46	.3	.3
Spray (custom)	6-row boom sprayer	.6	.6	1.0	16	.1	.1
Spray (custom)	Plane	.1	.1	1.0	9	1/	1/
Cultivate	2-row shovel	1.6	1.6	3.0	95	4.6	4.6
Cultivate and fertilize	2-row shovel/attachment	1.8	1.8	1.5	5	.1	.1
Irrigate	---	1.7	---	5.4	100	9.2	---
Hoe and weed	---	21.6	---	1.7	64	23.5	---
Dust	4-row duster	.8	.8	1.8	4	.1	.1
Dust (custom)	Plane	1/	1/	2.1	23	1/	1/
Total	---	---	---	---	---	129.7	13.9
Harvest:							
Undercut	2-row blade	1.8	1.8	1.0	52	.9	.9
Windrow	---	63.7	---	1.0	91	58.0	---
Top	---	249.2	---	1.0	12	29.9	---
Total 2/	---	---	---	---	---	88.8	.9
Total preharvest and harvest	---	---	---	---	---	3/ 218.5	3/ 14.8

1/ Less than 0.05 hour.

2/ Excludes inputs after onions were sold: still growing on 9 percent of the acreage, as topped onions on 12 percent of the acreage, and in the windrow on 79 percent of the acreage.

3/ Average yield per acre--321.8 cwt. Average labor and power used per cwt.--0.68 hour and 0.05 hour, respectively.

Table C.--Onions: Usual labor and power inputs, San Joaquin County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Disk	2	1.0	1.0	2.0	2.0
Plow	1	1.7	1.7	1.7	1.7
Float	1	.6	.6	.6	.6
Furrow	1	1.6	1.6	1.6	1.6
Fertilize	1	1.3	1.3	1.3	1.3
Set plants	1	92.3	---	92.3	---
Spray	1	.6	.6	.6	.6
Cultivate	3	1.6	1.6	4.8	4.8
Irrigate	5	1.7	---	8.5	---
Undercut	1	1.8	1.8	1.8	1.8
Windrow	1	63.7	---	63.7	---
Total	---	---	---	178.9	14.4

Table D.--Onions: Distribution of workers performing specified operations, by type of worker on 48 farms, San Joaquin County, Calif., 1958-59

Operation	Type of worker				
	Operator and unpaid family	Year-round hired	Local seasonal	Domestic migratory	Foreign
	Percent	Percent	Percent	Percent	Percent
Disk	87	9	4	0	0
Plow	96	2	2	0	0
Chisel	80	20	0	0	0
Level	93	7	0	0	0
Float	82	12	6	0	0
Furrow	90	8	2	0	0
Fertilize	94	6	0	0	0
Harrow	88	12	0	0	0
Seed	9	0	87	4	0
Set plants	3	4	83	0	10
Spray 1/	88	12	0	0	0
Cultivate	89	7	4	0	0
Cultivate and fertilize	100	0	0	0	0
Irrigate	83	5	12	0	0
Hoe	21	0	79	0	0
Weed	46	1	53	0	0
Dust 1/	100	0	0	0	0
Undercut	85	4	11	0	0
Windrow	5	0	77	0	18
Top	2	0	57	41	0

1/ Excludes custom operations.

Figure 8 and tables A, B, C, and D are based on information obtained covering the production of sweet peppers grown for the fresh market on 36 acres on 8 farms in 1958-59. The average yield per acre was 12.0 tons.

Tractors were the chief source of power on these farms. Size of tractor was not obtained in the survey, but size of equipment used indicates the average tractor was a 2- or 3-plow tractor with a drawbar horsepower rating of 15 to 30. Major land preparation operations were performed by tracklaying tractors having drawbar horsepower ratings of 50 to 80.

More than two-thirds of the bell pepper acreage was seeded, rather than set with transplants. In seeding such a crop directly in the field, growers generally plant heavy enough to assure a good stand, and usually the stand is too thick. Nearly all of the direct-seeded acreage was hand thinned.

Harvesting of peppers requires much labor, nearly 200 hours for 12 tons. Growers who harvested this crop picked their acreage an average of 10 times. However, production on most of the acreage was sold still growing, and harvest inputs were not obtained.

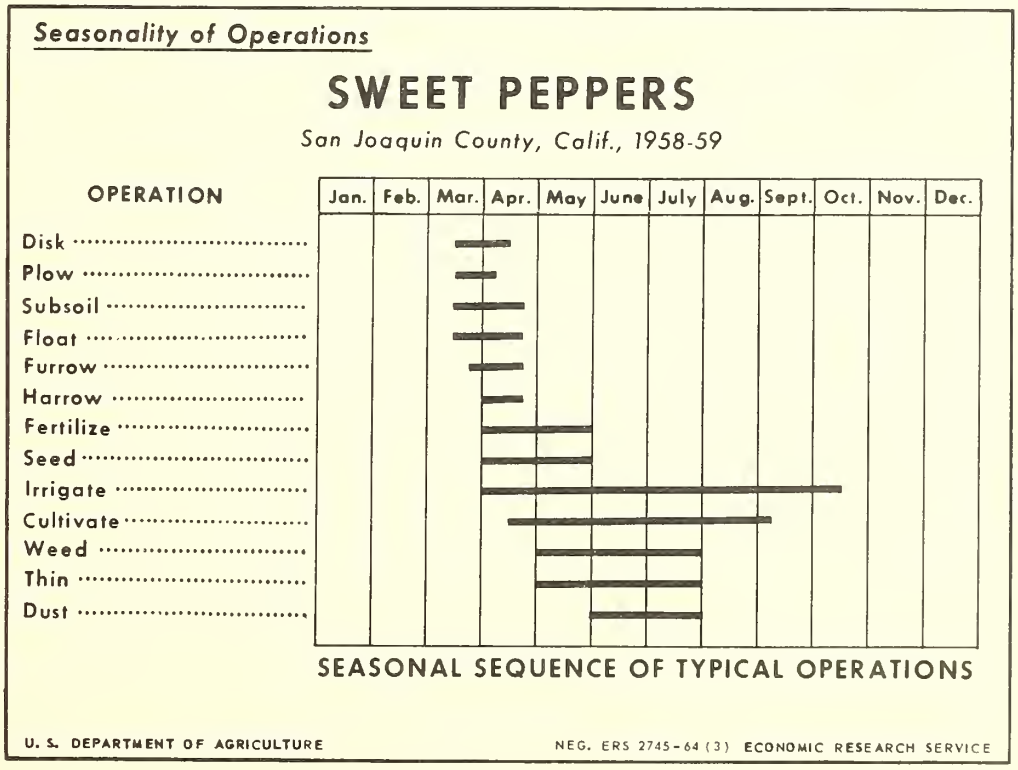

Figure 8

Table A.--Sweet peppers: Materials used and contract work hired, averages for 36 acres on 8 farms, San Joaquin County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Plants	Thousand	6.1	13.75	83.88	32	26.84
Seed	Pound	1.1	12.00	13.20	68	8.98
Dust, DDT	Pound	69.0	.12	8.28	58	4.80
Spray	Gallon	.8	11.53	9.22	22	2.03
Fertilizer nutrients:						
N	Pound	116.5	1/	1/	100	
P_2O_5	Pound	94.1	1/	1/	75	29.79
K_2O	Pound	74.6	1/	1/	72	
Crates	Each	387.5	.19	73.62	44	32.39
Irrigation water	Acre	1.0	11.48	11.48	75	8.61
Total	---	---	---	---	---	113.44
Contract work hired:						
Dust by plane, application only	Pound	70.0	.05	3.50	56	1.96
Total	---	---	---	---	---	1.96
Total materials and contract work	---	---	---	---	---	2/ 115.40

1/ Data not available.
2/ Average yield per acre--12.0 tons. Average cost of materials and contract work per ton--$9.62.

Table B.--Sweet peppers: Labor, power, and machinery used in producing and harvesting, averages for 36 acres on 8 farms, San Joaquin County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Disk	12-foot offset	1.0	1.0	1.8	100	1.8	1.8
Plow	2-bottom 14-inch moldboard	1.2	1.2	1.0	89	1.1	1.1
Subsoil	3-shank chisel	1.0	1.0	1.0	56	.6	.6
Float	10-foot float	.8	.8	1.0	90	.7	.7
Furrow	2-row lister	1.2	1.2	1.0	100	1.2	1.2
Harrow	3-section springtooth	.7	.7	1.0	70	.5	.5
Fertilize	2-row spreader	1.2	1.2	1.3	82	1.3	1.3
Fertilize	---	4.2	---	1.0	19	.8	---
Seed	2-row seeder	1.9	1.4	1.0	59	1.1	.8
Seed	---	23.4	---	1.0	9	2.1	---
Set plants	---	20.0	---	1.0	32	6.4	---
Irrigate	---	1.6	---	10.8	100	17.3	---
Cultivate	2-row shovel	1.8	1.8	2.1	100	3.8	3.8
Weed	---	20.0	---	1.2	55	13.2	---
Hoe	---	21.3	---	1.0	17	3.6	---
Thin	---	14.0	---	1.0	65	9.1	---
Spray	4-row boom sprayer	.6	.6	3.5	22	.5	.5
Dust (custom)	Plane	.1	.1	2.0	56	.1	.1
Dust	---	12.0	---	1.0	3	.4	---
Total	---	---	---	---	---	65.6	12.4
Harvest:							
Pick, pack, load, and haul	Truck	19.1	2.0	10.1	1/ 44	84.9	8.9
Total	---	---	---	---	---	84.9	8.9
Total preharvest and harvest	---	---	---	---	---	2/ 150.5	2/ 21.3

1/ Production from the remaining acreage was sold in the field.
2/ Average yield per acre--12.0 tons. Average labor and power used per ton--12.5 hours and 1.8 hours, respectively.

Table C.--Sweet peppers: Usual labor and power inputs, San Joaquin County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Disk	2	1.0	1.0	2.0	2.0
Plow	1	1.2	1.2	1.2	1.2
Subsoil	1	1.0	1.0	1.0	1.0
Float	1	.8	.8	.8	.8
Furrow	1	1.2	1.2	1.2	1.2
Harrow	1	.7	.7	.7	.7
Fertilize	1	1.2	1.2	1.2	1.2
Seed	1	1.9	1.4	1.9	1.4
Irrigate	11	1.6	---	17.6	---
Cultivate	2	1.8	1.8	3.6	3.6
Weed	1	20.0	---	20.0	---
Thin	1	14.0	---	14.0	---
Dust (custom)	2	.1	.1	.2	.2
Total	---	---	---	65.4	13.3

Table D.--Sweet peppers: Distribution of workers performing specified operations, by type of worker on 8 farms, San Joaquin County, Calif., 1958-59

Operation	Type of worker			
	Operator and unpaid family	Year-round hired	Local seasonal	Foreign
	Percent	Percent	Percent	Percent
Disk	72	14	14	0
Plow	72	14	14	0
Subsoil	0	100	0	0
Float	67	33	0	0
Furrow	83	0	17	0
Harrow	0	50	50	0
Fertilize	75	25	0	0
Fertilize by hand	100	0	0	0
Seed	75	25	0	0
Seed by hand	50	0	50	0
Set plants	67	0	33	0
Irrigate	63	25	12	0
Cultivate	83	17	0	0
Weed	43	0	43	14
Hoe	25	0	75	0
Thin	0	0	0	100
Spray	100	0	0	0
Dust 1/	100	0	0	0
Harvest	39	0	39	22

1/ Excludes custom operations.

Figure 9 and tables A, B, C, and D present information obtained on the growing and harvesting of tomatoes for the fresh market on 797 acres on 15 farms in 1958-59. The average yield per acre was 220.9 hundredweight.

Tractors were the chief source of power on these farms. Unless otherwise indicated, they were used for operations listed. Tractor size was not obtained in the survey, but size of equipment used indicates the average tractor was a 2- or 3-plow tractor with a drawbar horsepower rating of 15 to 30. Major land preparation operations were performed by tracklaying tractors having drawbar horsepower ratings of 50 to 80.

All of the tomato acreage was seeded directly in the field. Growers reported no transplanting, but undoubtedly did fill in skips during the hoeing and thinning operation.

In November 1959, a week of cold, frosty nights threatened loss of the late crop. However, resourceful growers hired helicopters to fly over the acreage, churning up the air with the rotors' downdraft, and thus prevented the cold air from settling and damaging the crops.

Harvesting of tomatoes was performed by farmer-supervised crews on nearly three-fourths of the acreage. Mexican nationals made up the bulk of the harvest force. These workers were paid piece rates averaging $0.16 per 50-pound lug. Production on the remainder of the acreage was sold unharvested.

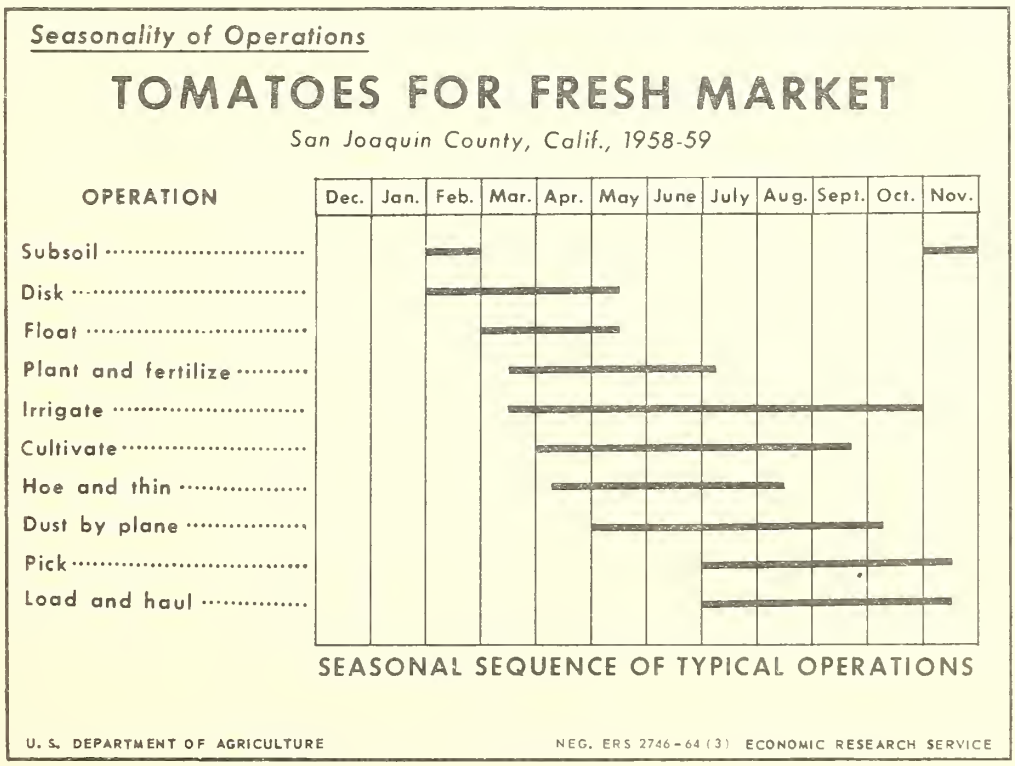

Figure 9

Table A.--Tomatoes: Materials used and contract work hired, averages for 797 acres on 15 farms, San Joaquin County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	0.8	12.77	10.22	100	10.22
Fertilizer nutrients:						
N	Pound	90.7	1/	1/	100	23.08
P_2O_5	Pound	79.2	1/	1/	85	
K_2O	Pound	26.2	1/	1/	20	
Dust, DDT and sulfur	Pound	76.0	.09	6.84	100	6.84
Irrigation water	Acre	1.0	12.23	12.23	85	10.40
Container rent	Each	735.0	.01	7.35	93	6.84
Total	---	---	---	---	---	57.38
Contract work hired:						
Dust by plane, no materials	Pound	75.8	.05	3.79	98	3.71
Frost protection 2/	Hour	.25	150.00	37.50	18	6.75
Total	---	---	---	---	---	10.46
Total materials and contract work	---	---	---	---	---	3/ 67.84

1/ Data not available.
2/ Use of helicopter's downdraft to stir up air to keep frost from forming.
3/ Average yield per acre--220.9 cwt. Average cost of materials and contract work per cwt.--$0.31.

Table B.--Tomatoes: Labor, power, and machinery used in producing and harvesting, averages for 797 acres on 15 farms, San Joaquin County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Disk	15-foot offset	0.5	0.5	2.0	100	1.0	1.0
Subsoil	3-shank subsoiler	1.6	1.6	1.0	54	.9	.9
Chisel	10-point chisel	.8	.8	1.0	25	.2	.2
Plow	3-bottom 14-inch moldboard	1.1	1.1	1.1	48	.6	.6
Float	12-foot float	.6	.6	1.0	100	.6	.6
Harrow	2-section springtooth	.7	.7	3.0	18	.4	.4
Furrow	2-row lister	.5	.5	1.9	40	.4	.4
Plant and fertilize	2-row seeder/attachment	2.0	.7	1.0	100	2.0	.7
Irrigate	---	1.7	---	7.0	100	11.9	---
Fertilize	2-row drill	.4	.4	1.7	42	.3	.3
Cultivate	2-row shovel	.8	.8	2.7	80	1.7	1.7
Cultivate and fertilize	2-row shovel/attachment	1.1	1.1	4.0	12	.5	.5
Hoe and thin	---	18.7	---	1.0	97	18.1	---
Dust	---	4.9	---	2.7	1	.1	---
Dust	4-row duster	.3	.3	3.5	1	1/	1/
Dust (custom)	Plane	1/	1/	2.8	98	1/	1/
Frost protection	Helicopter	1/	1/	5.0	18	1/	1/
Total	---	---	---	---	---	38.7	7.3
Harvest:							
Pick	---	28.5	---	7.0	2/ 72	143.6	---
Load and haul	Truck	1.5	.6	7.0	2/ 72	7.6	3.0
Total	---	---	---	---	---	151.2	3.0
Total preharvest and harvest	---	---	---	---	---	3/ 189.9	3/ 10.3

1/ Less than 0.05 hour.
2/ Production from the remaining acreage was sold in the field.
3/ Average yield per acre--220.9 cwt. Average labor and power used per cwt.--0.86 hour and 0.05 hour, respectively.

Table C.--Tomatoes: Usual labor and power inputs, San Joaquin County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Disk	2	0.5	0.5	1.0	1.0
Subsoil	1	1.6	1.6	1.6	1.6
Float	1	.6	.6	.6	.6
Plant and fertilize	1	2.0	.7	2.0	.7
Irrigate	7	1.7	---	11.9	---
Cultivate	3	.8	.8	2.4	2.4
Hoe and thin	1	18.7	---	18.7	---
Dust (custom)	3	1/	1/	1/	1/
Pick	7	28.5	---	199.5	---
Load and haul	7	1.5	.6	10.5	4.2
Total	---	---	---	248.2	10.5

1/ Less than 0.05 hour.

Table D.--Tomatoes: Distribution of workers performing specified operations, by type of worker on 797 acres on 15 farms, San Joaquin County, Calif., 1958-59

Operation	Type of worker					
	Operator and unpaid family	Year-round hired	Local seasonal	Domestic migratory	Foreign	Custom
	Percent	Percent	Percent	Percent	Percent	Percent
Disk	56	19	25	0	0	0
Subsoil	12	38	50	0	0	0
Plow	38	25	37	0	0	0
Float	37	27	36	0	0	0
Harrow	50	50	0	0	0	0
Furrow	67	16	17	0	0	0
Plant and fertilize	22	17	61	0	0	0
Irrigate	43	24	33	0	0	0
Fertilize	63	12	25	0	0	0
Cultivate	46	27	27	0	0	0
Cultivate and fertilize	100	0	0	0	0	0
Hoe and thin	0	0	5	3	92	0
Chisel	50	50	0	0	0	0
Dust	100	0	0	0	0	0
Dust by plane	0	0	0	0	0	100
Frost protection	0	0	0	0	0	100
Pick	1	0	1	1	97	0
Load and haul	10	39	20	1	30	0

Turnips

Figure 10 and tables A, B, C, and D present data on turnips produced on 28 acres on 8 farms in 1958-59. Turnips are commonly sold in units of 1 dozen bunches. The number of turnips per bunch varies with size. The average yield per acre was 701 dozen bunches.

Tractors were the chief source of power on these farms. Unless otherwise indicated, they were used for operations listed. Size of tractor was not obtained in the survey, but judging from equipment used on operations listed in table B, the average size tractor was a 2- or 3-plow tractor with a drawbar horsepower rating of 15 to 30. Major land preparation operations were performed by tracklaying tractors having drawbar horsepower ratings of 50 to 80.

Acreage of turnip production is so small that it is not reported by the Crop Reporting Board, Statistical Reporting Service, USDA. For the United States in 1959, however, 24 carlots of turnips and rutabagas were shipped to the fresh market, and the commercial pack of frozen turnip greens totaled 13,730,000 pounds. 8/

The production of bunched turnips on these 8 farms was a family enterprise. Most of the work was performed by the operator and his family (table D).

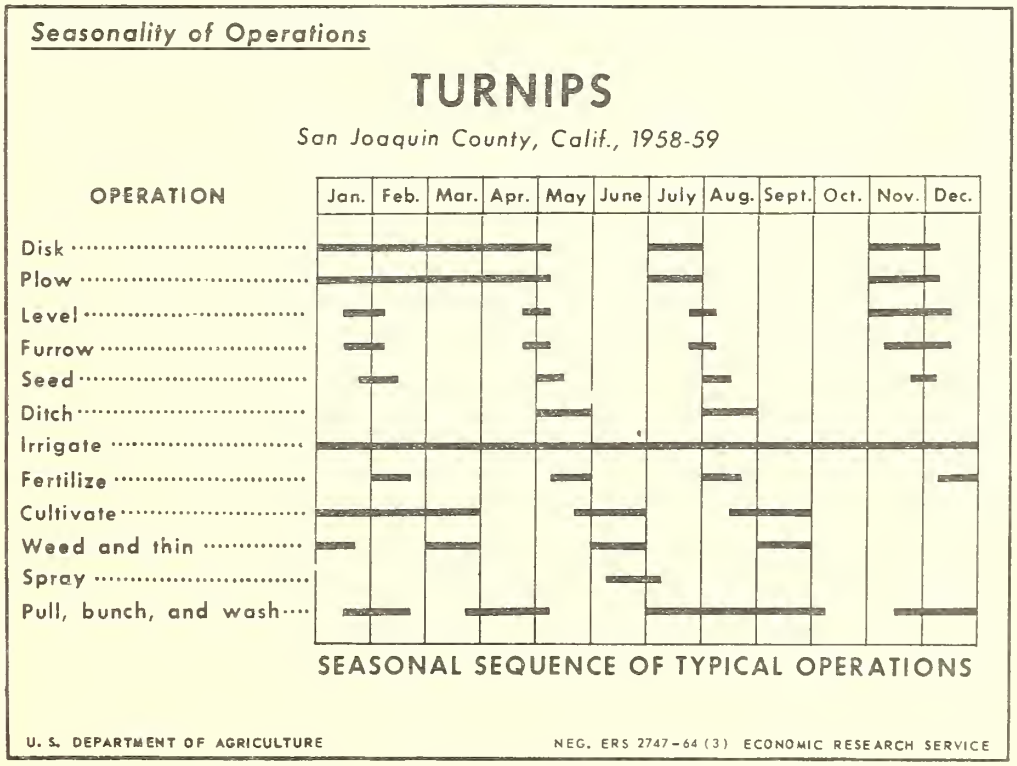

Figure 10

8/ U. S. Department of Agriculture. Agricultural Statistics, 1962, tables 373 and 378.

Table A.--Turnips: Materials used, averages for 28 acres on 8 farms, San Joaquin County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Seed	Pound	1.8	1.03	1.85	100	1.85
Fertilizer nutrients:						
N	Pound	140.3	1/	1/	100	
P_2O_5	Pound	189.1	1/	1/	50	29.05
K_2O	Pound	79.3	1/	1/	50	
Spray, DDT and malathion	Pound	5.4	.71	3.83	74	2.83
Twine	Pound	19.1	.52	9.93	100	9.93
Irrigation water	Acre	1.0	11.56	11.56	100	11.56
Total	---	---	---	---	---	2/ 55.22

1/ Data not available.
2/ Average yield per acre--701 dozen bunches. Average cost of materials per dozen bunches--$0.08.

Table B.--Turnips: Labor, power, and machinery used in producing and harvesting, averages for 28 acres on 8 farms, San Joaquin County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Disk	8-foot offset	1.0	1.0	3.4	100	3.4	3.4
Plow	3-bottom 14-inch moldboard	1.8	1.8	1.0	84	1.5	1.5
Level	12-foot landplane	1.4	1.4	1.0	84	1.2	1.2
Harrow	2-section springtooth	2.2	2.2	1.0	12	.3	.3
Furrow	2-row lister	1.6	1.6	1.0	82	1.3	1.3
Seed	2-row seeder	1.9	1.9	1.0	100	1.9	1.9
Ditch	1-shank chisel	.2	.2	2.0	90	.4	.4
Irrigate	---	2.3	---	7.5	100	17.2	---
Fertilize	2-row drill	3.6	2.0	2.1	84	6.4	3.5
Cultivate	2-row shovel	1.8	1.8	2.3	100	4.1	4.1
Cultivate and fertilize	2-row shovel/attachment	6.0	6.0	1.0	11	.7	.7
Weed and thin	---	21.4	---	1.0	84	18.0	---
Spray	---	1.8	---	1.0	11	.2	---
Spray	4-row boom sprayer	1.2	1.2	2.0	63	1.5	1.5
Total	---	---	---	---	---	58.1	19.8
Harvest:							
Pull, bunch, and wash	---	179.4	---	1.0	100	179.4	---
Total	---	---	---	---	---	179.4	---
Total preharvest and harvest	---	---	---	---	---	1/ 237.5	1/ 19.8

1/ Average yield per acre--701 dozen bunches. Average labor and power used per dozen bunches--0.34 hour and 0.03 hour, respectively.

Table C.--Turnips: Usual labor and power inputs, San Joaquin County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Disk	3	1.0	1.0	3.0	3.0
Plow	1	1.8	1.8	1.8	1.8
Level	1	1.4	1.4	1.4	1.4
Furrow	1	1.6	1.6	1.6	1.6
Seed	1	1.9	1.9	1.9	1.9
Ditch	2	.2	.2	.4	.4
Irrigate	8	2.3	---	18.4	---
Fertilize	2	3.6	2.0	7.2	4.0
Cultivate	2	1.8	1.8	3.6	3.6
Weed and thin	1	21.4	---	21.4	---
Spray	2	1.2	1.2	2.4	2.4
Pull, bunch, and wash	1	179.4	---	179.4	---
Total	---	---	---	242.5	20.1

Table D.--Turnips: Distribution of workers performing specified operations, by type of worker on 28 acres on 8 farms, San Joaquin County, Calif., 1958-59

Operation	Type of worker	
	Operator and unpaid family	Local seasonal
	Percent	Percent
Disk	100	0
Plow	100	0
Level	100	0
Harrow	100	0
Furrow	100	0
Seed	100	0
Ditch	100	0
Irrigate	100	0
Fertilize	100	0
Cultivate	100	0
Cultivate and fertilize	100	0
Weed and thin	81	19
Spray by hand	100	0
Spray by machine	100	0
Pull, bunch, and wash	67	33

Figure 11 and tables A, B, C, and D present data covering the growing and harvesting of watermelons on 427 acres on 11 farms in 1958-59. The average yield per acre was 11.6 tons.

Tractors were the chief source of power on these farms. Unless otherwise indicated, they were used for operations listed. Size of tractor was not obtained in the survey. However, considering the size of equipment used on these operations, the average tractor would have been about a 2- or 3-plow tractor with a drawbar horsepower rating of 15 to 30. Major land preparation operations were performed by tracklaying tractors having drawbar horsepower ratings of 50 to 80.

Production inputs used on watermelon acreage are quite limited. On 7 farms, no fertilizer was applied to this crop. Growers apparently felt that there was enough residual fertilizer in the soil to handle the relatively light nutrient requirements of this crop. The largest single input cost, other than for labor, was for water.

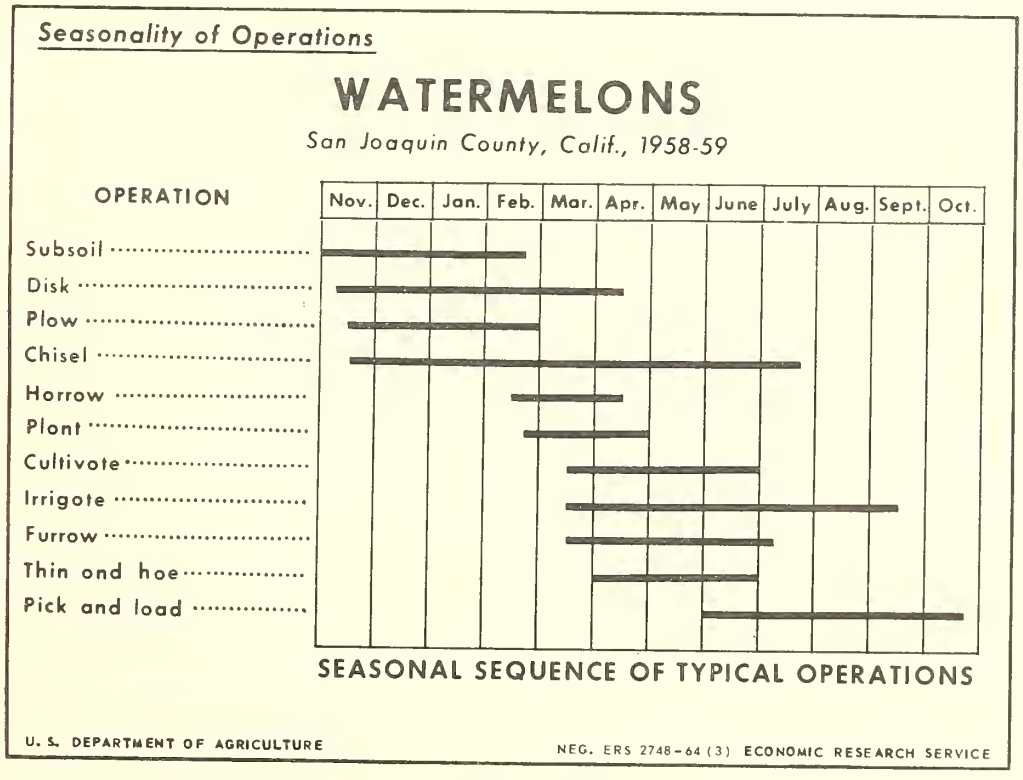

Figure 11

Table A.--Watermelons: Materials used and contract work hired, averages for 427 acres on 11 farms, San Joaquin County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	1.9	1.76	3.34	100	3.34
Dust	Pound	59.1	.23	13.59	57	7.75
Spray	Pound	60.2	.15	9.30	40	3.72
Fertilizer nutrients:						
N	Pound	21.2	1/	1/	28	2.28
P_2O_5	Pound	21.7	1/	1/	14	
K_2O	Pound	16.7	1/	1/	14	
Manure	Ton	6.0	2.50	15.00	7	1.05
Irrigation water	Acre	1.0	10.53	10.53	100	10.53
Total	---	---	---	---	---	28.67
Contract work hired:						
Subsoil	Hour	.48	15.00	7.20	28	2.02
Apply manure	Ton	6.0	.25	1.50	7	.10
Dust by plane, no materials	Pound	72.4	.05	3.62	34	1.23
Spray by plane, no materials	Acre	1.0	2.00	2.00	11	.22
Total	---	---	---	---	---	3.57
Total materials and contract work	---	---	---	---	---	2/ 32.24

1/ Data not available.
2/ Average yield per acre--11.6 tons. Average cost of materials and contract work per ton--$2.78.

Table B.--Watermelons: Labor, power, and machinery used in producing and harvesting, averages for 427 acres on 11 farms, San Joaquin County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Subsoil	2-shank subsoiler	1.7	1.7	1.0	31	0.5	0.5
Subsoil (custom)	2-shank subsoiler	1.7	1.7	1.0	28	.5	.5
Disk	8-foot offset	.7	.7	2.3	100	1.6	1.6
Plow	3-bottom 14-inch moldboard	.9	.9	1.0	53	.5	.5
Chisel	5-shank	.9	.9	1.5	75	1.0	1.0
Float	12-foot landplane	.3	.3	1.0	30	.1	.1
Apply manure (custom)	Truck spreader	.6	.6	1.0	7	1/	1/
Harrow	8-foot spiketooth	.4	.4	1.0	66	.3	.3
Plant	1-row planter	.7	.5	1.0	100	.7	.5
Cultivate	5-shank cultivator	.7	.7	3.3	100	2.3	2.3
Furrow	1-row lister	.4	.4	3.3	100	1.3	1.3
Irrigate	---	1.1	---	8.4	100	9.2	---
Thin and hoe	---	5.7	---	1.7	86	8.3	---
Spray	6-row boom sprayer	.4	.4	1.7	33	.2	.2
Dust	---	.5	---	1.5	23	.2	---
Fertilize	1-row drill	.5	.5	1.0	20	.1	.1
Cultivate and fertilize	1-row cultivator/attachment	.9	.9	1.0	8	.1	.1
Dust (custom)	Plane	.1	.1	2.0	34	.1	.1
Spray (custom)	Helicopter	.1	.1	1.0	11	1/	1/
Total	---	---	---	---	---	27.0	9.1
Harvest:							
Pick and load	Truck	5.8	.5	5.1	100	29.6	2.6
Total	---	---	---	---	---	29.6	2.6
Total preharvest and harvest	---	---	---	---	---	2/ 56.6	2/ 11.7

1/ Less than 0.05 hour.
2/ Average yield per acre--11.6 tons. Average labor and power used per ton--4.88 hours and 1.01 hour, respectively.

Table C.--Watermelons: Usual labor and power inputs, San Joaquin County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Subsoil	1	1.7	1.7	1.7	1.7
Disk	2	.7	.7	1.4	1.4
Plow	1	.9	.9	.9	.9
Chisel	2	.9	.9	1.8	1.8
Harrow	1	.4	.4	.4	.4
Plant	1	.7	.5	.7	.5
Cultivate	3	.7	.7	2.1	2.1
Furrow	3	.4	.4	1.2	1.2
Irrigate	8	1.1	---	8.8	---
Thin and hoe	2	5.7	---	11.4	---
Pick and load	5	5.8	.5	29.0	2.5
Total	---	---	---	59.4	12.5

Table D.--Watermelons: Distribution of workers performing specified operations, by type of worker on 427 acres on 11 farms, San Joaquin County, Calif., 1958-59

Operation	Type of worker					
	Operator and unpaid family	Year-round hired	Local seasonal	Domestic migratory	Foreign	Custom
	Percent	Percent	Percent	Percent	Percent	Percent
Subsoil	0	40	20	0	0	40
Disk	73	27	0	0	0	0
Plow	67	16	17	0	0	0
Chisel	88	12	0	0	0	0
Float	0	50	50	0	0	0
Apply manure	0	0	0	0	0	100
Harrow	71	29	0	0	0	0
Plant	69	19	12	0	0	0
Cultivate	77	23	0	0	0	0
Furrow	89	11	0	0	0	0
Irrigate	67	8	25	0	0	0
Thin and hoe	13	0	44	6	37	0
Spray	100	0	0	0	0	0
Dust	100	0	0	0	0	0
Fertilize	50	50	0	0	0	0
Cultivate and fertilize	100	0	0	0	0	0
Dust by plane	0	0	0	0	0	100
Spray by plane	0	0	0	0	0	100
Pick and load	9	4	14	40	33	0

VEGETABLES FOR PROCESSING

Vegetables for processing are those which, at time of planting, were intended for sale to the processing industry.

Tomatoes

Figure 12 and tables A, B, C, and D present data covering the growing and harvesting of tomatoes for processing on 14,964 acres on 156 farms. Yield per acre averaged 15.15 tons.

Tractors were the chief source of power on these farms. Unless otherwise indicated, they were used for operations listed. While size of tractor was not obtained in this survey, the size of equipment used indicates that most cultural operations were performed with 3- or 4-plow tractors having drawbar horsepower ratings of 20 to 40. Major land preparation operations were performed with tracklaying tractors having drawbar horsepower ratings of 50 to 80.

Tomato growers established a stand of plants in one or more of three ways: (1) direct seeding in the field, (2) setting of purchased plants, or (3) the growing of plants in a plantbed and transplanting them in the field. Input data obtained on the plantbed operations were inadequate for separate tabulation and analysis. Therefore, acreage set with homegrown plants was assessed the cost of purchased plants.

The airplane was valuable to the tomato grower. He dusted 100 percent of his tomato acreage an average of 2.2 times by hired aircraft. In addition, 15 percent of the acreage was sprayed by planes.

On the average, tomato acreage was harvested three times. The majority of the pickers were Mexican nationals. Pickers were paid piece rates which ranged from 12 to 23 cents per 50-pound lug box and averaged 16 cents. Loaders averaged 2 cents per lug.

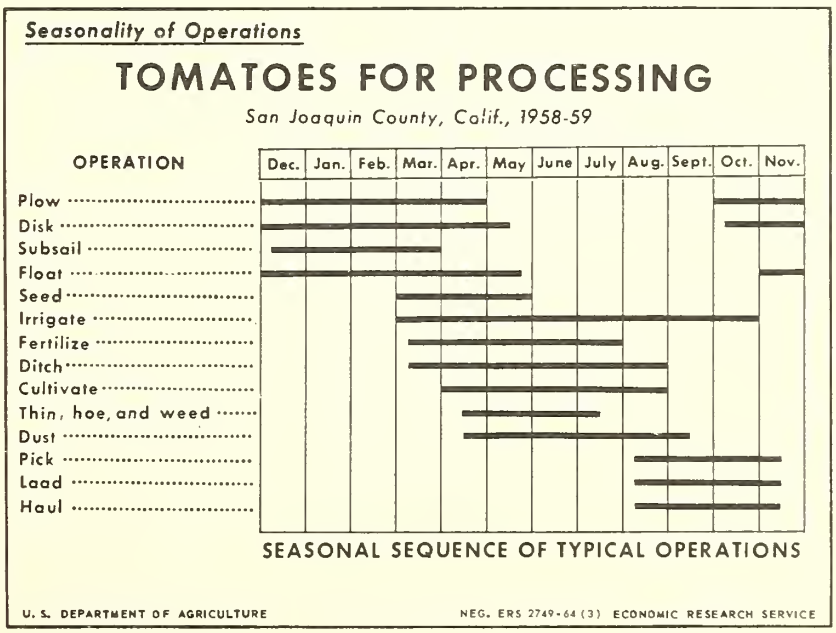

Figure 12

Table A.--Tomatoes: Materials used and contract work hired, averages for 14,964 acres on 156 farms, San Joaquin County, Calif., 1958-59

Item	Unit	Units per acre covered	Price per unit	Cost per acre covered	Percentage of total acreage covered	Cost per acre, total acreage
		Number	Dollars	Dollars	Percent	Dollars
Materials used:						
Seed	Pound	0.67	10.13	6.79	58	3.94
Plants	Thousand	5.30	6.46	34.24	42	14.38
Fertilizer nutrients:						
N	Pound	75.9	1/	1/	88	
P_2O_5	Pound	65.2	1/	1/	73	17.30
K_2O	Pound	37.2	1/	1/	30	
Dust, DDD and DDT	Pound	72.4	.105	7.60	100	7.60
Spray, assorted	Gallon	2.96	.91	2.69	15	.40
Fumigant, Nemagon	Gallon	9.31	1.88	17.50	7	1.22
Container rent	Each	606.0	.01	6.06	100	6.06
Irrigation water	Acre	1.0	10.64	10.64	62	6.60
Total	---	---	---	---	---	57.50
Contract work hired:						
Subsoil	Acre	1.0	8.09	8.09	5	.40
Fumigate, no materials	Acre	1.0	4.60	4.60	7	.32
Fertilize, no materials	Acre	1.2	2.02	2.42	12	.29
Dust by plane, no materials	Pound	72.4	.05	3.62	100	3.62
Spray by plane, no materials	Acre	1.1	3.02	3.32	15	.50
Total	---	---	---	---	---	5.13
Total materials and contract work	---	---	---	---	---	2/ 62.63

1/ Data not available.
2/ Average yield per acre--15.15 tons. Average cost of materials and contract work per ton--$4.13.

Table B.--Tomatoes: Labor, power, and machinery used in producing and harvesting, averages for 14,964 acres on 156 farms, San Joaquin County, Calif., 1958-59

Operation	Type and size of equipment	Time per acre, once over		Times over, acreage covered	Percentage of total acreage covered	Time per acre, total acreage	
		Man	Power			Man	Power
		Hours	Hours	Number	Percent	Hours	Hours
Preharvest:							
Disk	15-foot offset	0.5	0.5	2.3	95	1.1	1.1
Plow	4-bottom 14-inch moldboard	.9	.9	1.0	69	.6	.6
Subsoil	2-shank subsoiler	1.1	1.1	1.1	55	.7	.7
Subsoil (custom)	2-shank subsoiler	.9	.9	1.0	5	1/	1/
Chisel	9-shank	.6	.6	1.2	43	.3	.3
Float	10-foot float	.6	.6	1.3	86	.7	.7
Flood	---	5.8	---	1.0	4	.2	---
Harrow	3-section spiketooth	.7	.7	1.3	31	.3	.3
Furrow	4-row shovel	.4	.4	1.2	38	.2	.2
Fumigate (custom)	2-row applicator	.8	.8	1.0	7	.1	.1
Seed	2-row seeder	1.1	.7	1.0	58	.6	1/
Set plants	2-row planter	5.1	1.3	1.0	42	2.1	.5
Irrigate	---	1.8	---	6.9	100	12.4	---
Fertilize	2-row drill	.5	.4	1.1	82	.5	.4
Ditch	8-foot blade	.3	.3	3.2	100	1.0	1.0
Fertilize (custom)	2-row tank applicator	.4	.4	1.2	12	.1	.1
Cultivate	2-row shovel	.7	.7	3.2	100	2.2	2.2
Cultivate and fertilize	2-row shovel/attachment	.5	.5	1.0	6	.3	.3
Thin, hoe, and weed	---	15.4	---	1.0	58	8.9	---
Hoe and weed	---	7.1	---	1.3	45	4.2	---
Dust (custom)	Plane	1/	1/	2.2	100	1/	1/
Dust	4-row duster	.7	.6	1.1	7	.1	1/
Spray (custom)	Plane	1/	1/	1.1	15	1/	1/
Total	---	---	---	---	---	36.6	8.5
Harvest:							
Pick	---	30.7	---	3.0	2/ 93	85.7	---
Load	---	3.2	---	3.0	2/ 93	8.9	---
Haul	Truck	3.1	3.1	3.0	2/ 93	8.6	8.6
Total	---	---	---	---	---	103.2	8.6
Total preharvest and harvest	---	---	---	---	---	3/ 139.8	3/ 17.1

1/ Less than 0.05 hour.
2/ Production from the remaining acreage was sold in the field.
3/ Average yield per acre--15.15 tons. Average labor and power used per ton--9.23 hours and 1.13 hours, respectively.

Table C.--Tomatoes: Usual labor and power inputs, San Joaquin County, Calif., 1958-59

Operation	Times over	Time per acre, once over		Time per acre, total	
		Man	Power	Man	Power
	Number	Hours	Hours	Hours	Hours
Disk	2	0.5	0.5	1.0	1.0
Plow	1	.9	.9	.9	.9
Subsoil	1	1.1	1.1	1.1	1.1
Float	1	.6	.6	.6	.6
Seed	1	1.1	.7	1.1	.7
Irrigate	7	1.8	---	12.6	---
Fertilize	1	.5	.4	.5	.4
Ditch	3	.3	.3	.9	.9
Cultivate	3	.7	.7	2.1	2.1
Thin, hoe, and weed	1	15.4	---	15.4	---
Dust (custom)	2	1/	1/	1/	1/
Pick	3	30.7	---	92.1	---
Load	3	3.2	---	9.6	---
Haul	3	3.1	3.1	9.3	9.3
Total	---	---	---	147.2	17.0

1/ Less than 0.05 hour.

Table D.--Tomatoes: Distribution of workers performing specified operations, by type of worker on 156 farms, San Joaquin County, Calif., 1958-59

Operation	Type of worker					
	Operator and unpaid family	Year-round hired	Local seasonal	Domestic migratory	Foreign	Custom
	Percent	Percent	Percent	Percent	Percent	Percent
Plow	44	43	13	0	0	0
Disk	47	42	11	0	0	0
Subsoil	26	54	10	0	0	10
Chisel	40	45	15	0	0	0
Float	40	48	12	0	0	0
Flood	25	75	0	0	0	0
Harrow	39	52	9	0	0	0
Furrow	52	38	10	0	0	0
Fumigate	0	0	0	0	0	100
Seed	30	40	30	0	0	0
Set plants	19	9	65	7	0	0
Irrigate	47	24	28	1	0	0
Fertilize	40	27	13	0	0	20
Ditch	49	46	5	0	0	0
Cultivate	49	38	13	0	0	0
Cultivate and fertilize	40	40	20	0	0	0
Thin, hoe, and weed	1	0	18	4	77	0
Hoe and weed	3	2	38	1	56	0
Dust (custom)	0	0	0	0	0	100
Dust	35	19	46	0	0	0
Spray	86	0	14	0	0	0
Pick	0	1	1	13	85	0
Load	0	0	10	16	74	0
Haul	0	0	100	0	0	0

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